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# THE HAWAIIAN FORESTER AGRICULTURIST

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## *IMPORTANCE OF PROTECTING THE MILK SUPPLY.*

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In the annual report of the regents of the Smithsonian Institution, for the year ending June 30, 1911, there is an exceedingly interesting article entitled, "Profitable and Fruitless Lines of Endeavor in Public Health Work," by Edwin O. Jordan, Professor of Bacteriology, University of Chicago. In some points the article is as startling as anything that has come from Chicago professors—some of whose pronouncements in recent years have produced world thrills—for it sets forth opinions that must shock the ordinary sanitarian in regard to methods that have come to be deemed based on first principles of public hygiene. Professor Jordan attacks with the citation of authorities and evidence the expenditure of large proportions of health funds, as well as restrictive legislation, upon disinfection, the removal of garbage, plumbing inspection, etc. Even the house fly has a plea in abatement entered on his behalf, to the now almost universal indictment of being a disseminator of disease. Here is a specimen of Professor Jordan's iconoclastic criticism of modern sanitary methods, on a subject additional to those just mentioned:

"In the matter of heating and ventilation enormous sums have been spent and are being spent to renew the air in rooms and public assembly halls and to introduce pure air in what has been assumed to be necessary amounts. And yet if the work of Beu, Heymann, Paul, Erclentz, Flugge, Leonard Hill and others means anything, it demonstrates that the whole effect from bad air and crowded rooms is due to heat and moisture and not to carbon dioxide or to any poisonous excretions in expired air. When all the effects of crowd poison upon a group of individuals in an experimentally sealed chamber can be eliminated by rapidly whirling electric fans, it is useless any longer to look upon carbon dioxide as a measure of danger. If we recognize that all the discomfort from breathing air in a confined space is due to a disturbance of the thermal relations of the body, the problem of ventilation becomes very different from what has usually been supposed."

The matters above referred to are, however, somewhat foreign

to the scope of this magazine, but mention of them may add to the interest with which Professor Jordan's discussion of one of the most serious problems with which the division of animal industry is concerning itself will be perused—that is, the protection of the milk supply from danger to consumers. On this subject he says:

"The importance of control and supervision of the sources of public water supply has long been recognized, but the importance of controlling the quality of the public milk supply, although frequently urged by sanitarians, is not always appreciated. At the present time in the great majority of American cities it is safe to say that for every case of infectious disease due to drinking water ten cases are caused by infected milk. It is difficult to procure adequate funds for the sanitary control of the milk supply. By sanitary control of milk is meant not the upholding of a rigorous standard of butter fat and total solids, but the maintenance of proper standards of cleanliness and health for dairy cows and especially the safeguarding the milk from infection during collection and transportation. Under some conditions the protection of the consumer against milk-borne infection may be best brought about by compulsory pasteurization of that portion of the milk supply which can not otherwise be raised to proper standard. Whatever method of control be adopted, it is certain that any genuine improvement in the character of a milk supply will be followed in the long run by a lessening in the amount of typhoid fever, diphtheria, scarlet fever and, to some extent, tuberculosis. The early detection of a single case of typhoid fever or scarlet fever on a dairy farm may be the means not only of preventing an extensive epidemic, but of avoiding the formation of scores of new foci which can in turn serve to light up subsequent cases for many years. Proper pasteurization of milk has been followed in many cities, as in Glasgow, Liverpool and London, by an immediate and material reduction in the amount of typhoid fever. In other words, the connection between an expenditure of public money and a direct return in prevention of disease can be more clearly demonstrated in the case of milk supply control than in some other of the usual municipal health department activities.

"The question whether the quality of a city milk supply can be more favorably influenced by inspection and supervision at the source, or by generally enforced and controlled pasteurization, is one upon which there is still some difference of opinion among experts. There is little doubt, however, that simply as a matter of economy of administration much is to be said at present in favor of centralized pasteurization of a large portion of the supply. Viewed as a method for preventing a large number of cases of infectious disease at relatively small expenditure the pasteurization of milk certainly ranks high among effective health measures."

It may be stated that a large proportion of the milk supply of Honolulu is pasteurized by private corporate enterprise, making the problem here so much the lighter should public facilities for the process be resolved on. Pasteurization should not, by any means, be considered as a substitute for bovine tuberculosis control, in which great progress has been made on this island. As a measure of economic protection alone this campaign is justified, the same as exterminative and preventive methods against any disease of live stock.

In an article on insect pests of the New Zealand flax, by C. French, Jun, acting government entomologist, in the Journal of Agriculture of Victoria, December 10, the white mussel scale (*Phenacaspis eugeniae*) is said to be recorded from most parts of Australia, Ceylon, Japan and Hawaiian Islands.

The Philippine Review advocates the introduction into that archipelago of hippopotami for enlarging the meat supply. The lake region of the Agusan Valley, Mindanao, would seem to be eminently well adapted for the rearing of hippos, and the writer of the article is of the opinion that, if this entire region were made into a large reservation and stocked with these animals, it could be more profitably utilized in this than in any other way, thus supplying a large quantity of excellent meat in place of that which is now imported.

### INDEX TO VOLUME IX.

With this number are presented the table of contents and index to Volume IX of the Hawaiian Forester and Agriculturist. The same method of indexing as was used for the preceding volume has been adopted. Reports of meetings of the Board of Agriculture and Forestry, annual and monthly reports of divisions, important articles on local interests and references to business concerns, government bodies, institutions, organizations, persons and publications are sub-indexed alphabetically. This keeps everything relating to one main topic together, probably enhancing the readiness of reference. The segregation of comparatively unimportant matters, such as names of persons mentioned and publications announced or quoted, makes the analyses of the important contents of the volume stand out in clearer relief than if scattered amidst the former data. At the same time the separation of names in their proper classes will show at a glance the wide range of the magazine's purview and sources of information and opinion upon matters within its jurisdiction. An instance of the value of an index to those who preserve their copies of the magazine was afforded by the present index before it was even sent to press. A departmental official had in preparation an important



document, in which he desired to mention the time of a certain event which had slipped his memory. Recourse to the typewritten copy of the index showed the thing wanted in an instant.

### THE BLACK WITCH.

Discussing the character of the black witch (*Crotophaga ani*), an insect-eating bird, the Agricultural News makes some remarks that should be of interest here, where the question of the introduction of insectivorous birds has received much attention. What is quoted below will show that the care nowadays displayed by the Hawaiian authorities, as distinguished from the carelessness of former times, in deciding upon what birds may safely be introduced, is highly justified. Among other information and comment on the black witch, the Agricultural News gives the following:

"This bird is known by a number of common names, among which are the following: ani, black parrot, savannah blackbird, tick bird, black witch, keel bill, and (in St. Lucia) merle corbeau.

"The black witch is generally conceded to be a most useful bird on account of its insect-eating habits; its food includes many pests, and certain insects which are not generally eaten by birds. In Jamaica, the black witch has been observed eating stink bugs and cotton stainers: these are not often used as food by birds, on account of characteristic offensive odors possessed by them. Ticks also form part of the food of the black witch, and on account of its tick-feeding habits it is called the tick bird in certain localities. As an enemy of the insect pests of cotton, also, the bird is very useful.

"As in the case of all insectivorous birds, however, this one captures and devours beneficial insects, such as ladybirds and wasps, and it is probable that any beneficial as well as injurious insects are eaten as opportunity offers. In addition to ticks and insects, seeds and berries are also eaten.

"The question has recently been raised as to whether a useful purpose would be served by the introduction of the black witch into the island of Antigua. It would seem at first sight that the introduction of a bird whose feeding habits are known to be so useful could produce only beneficial results, but so many instances are known where the introduction of a species of bird or animal into a new locality has produced conditions other than those which were sought, that it is best carefully to consider whether there is another aspect of the question.

"The habit of destroying ticks, stinking plant bugs and cotton stainers is one which entitles its possessor to recognition, but the fact that beneficial insects are also destroyed should be taken into account. There seems to be no record of definite observations

which would lead to the forming of a conclusion as to the actual value of the black witch in the Lesser Antilles and the possibilities of its becoming a nuisance or even a pest in later years. Predaceous beetles (lady-birds) and wasps (Jack Spaniards) exert a considerable influence on the natural control of many insect pests, and the destruction of these forms of insect life might result in the increase of certain pests, especially the scale insects, which would not themselves be attacked by such a bird as the black witch."

It is said that the destruction of birds cost \$420,100,000. This is the sum placed by the conservation congress, due to the lack of birds sufficient to fight destructive insects. This is altogether too large an annual fee to pay for hat adornment and the gratification of thoughtless boys and men who care nothing for the great good birds do.—The farmer is the greater sufferer.—*Good Advertising.*

#### INCREASING DEMAND FOR CACAO.

The rapidly increasing demand for cacao is amply illustrated in the world's consumption of cacao which has increased from 122,526 tons in 1903 to 232,200 tons in 1911. In this connection it is interesting to know that Mexico, where the Europeans first found this "drink of the gods," as it was styled by Linné, has practically ceased to export cacao. Why does not the Philippines wake up to her opportunities as a cacao producer and exporter?—*Philippine Review.*

#### PROGRESS OF PORTO RICO.

The annual report of the Agricultural experiment station of Porto Rico has just been issued and contains many items of interest to the residents of the Philippines considering the situation of both these countries.

The trade of Porto Rico has increased from 33,200,000 pesos in 1900 to 157,400,000 pesos in 1911, of which 80,000,000 pesos are exports, all agricultural materials, raw or manufactured. Sugar is the leading export now. Tobacco and cigars to the value of 14,000,000 pesos were exported—other manufactured products were preserved fruits, straw hats, and distilled spirits. The advance of agri-horticultural science is shown by the importation of artificial fertilizers to the value of 2,000,000 pesos. Steam plows are largely utilized on the large sugar estates, and the cable plow is there favored in preference to the motor truck. Coffee in Porto Rico is a crop of considerable importance but pineapples and citrus fruits are now encroaching upon the coffee.

The growth of the fruit industry in Porto Rico during the last decade is remarkable. From nothing, the fruit export has during

the time grown to 3,600,000 pesos during the past fiscal year, yet the fruit orchards are just coming into bearing. Very superior pomelos and oranges are produced and aside from the fresh fruit shipped to the United States several pineapple canneries are in operation there.—*P. J. W.*, in *Philippine Review*.

### GOVERNMENTS HELP FARMERS.

In no other country in the world does the government lend aid to its farmers as does Denmark. The greatest energy is expended in securing the largest and most economical production of butter, bacon, and eggs. The most significant thing is that the greatest efforts are made to help the small farmer, with the result that the country is now almost wholly made up of small farms. One of the principal sources of aid is through furnishing farmers with cheap money. The government controls a series of banks. A laborer who has worked on a farm five years, and who has a character so good that two reputable farmers will certify to it, may obtain from one of these banks a loan corresponding to about 3164 pesos in Philippine currency. With this he may purchase a farm of from  $1\frac{1}{2}$  to 5 hectares. The amount loaned by the bank covers probably nine-tenths of the value of the farm. Experts of the government visit every farm in Denmark every eighteen days and advise with the farmers as to the best methods of handling their business.

\* \* \* \*

A new departure in fostering an infant industry is the proposal of the governments of New South Wales and Victoria in Australia to establish vegetable and fruit-preserving factories in regions newly opened for colonization. These factories will be operated by the departments of agriculture of their respective states, the produce handled at a moderate rate, and if the settlers desire, the factories may later be acquired and operated under coöperative management.

The colonists will also be aided by the government in the production and specialization of the fruits that are best adapted to the regions under consideration and which make a superior canned product. This Australian enterprise might well serve as a good object lesson to the Philippines.—*P. J. W.*, in *Philippine Review*.

## COLLEGE OF TROPICAL AGRICULTURE.

University of the Philippines College of Agriculture,  
LOS BANOS, October 22, 1912.

The Editor of the *Tropical Agriculturist*, Colombo, Ceylon.

Dear Sir:—I note in your issue of September, 1912, pages 225 and 256, some observations regarding the need of a tropical college of agriculture, and the statement that "Neither Great Britain nor the United States of America can be said to have a tropical department worthy of the name, attached to any of their agricultural colleges." This is probably literally true, as the Philippines are not, strictly speaking, a part of the United States, and the University of the Philippines is supported entirely from the revenues of the insular Government. There is, however, the College of Agriculture of this University operating under the American flag, thoroughly well established with some 280 students and more than three years of work to its credit. I believe that it accomplishes exactly the end you desire to be accomplished by a tropical college of agriculture, and that the instruction given in it covers sufficiently closely that which is desired in Ceylon and elsewhere in the tropics, so that students trained here would be found well trained for use in other tropical countries.

However, I do not, for a moment, think that the presence of a well equipped college in the Philippines which has already demonstrated that it can give a good education in tropical agriculture, is to be entertained as a reason for not establishing similar institutions in other tropical lands. On the other hand, the demand which has been shown here for instruction in tropical agriculture is the best possible reason for believing that similar institutions will succeed elsewhere. This college opened its doors in 1909, and during the first year had 55 students. The attendance was 95 the second year, 177 the third year, and is now, as already stated, more than 280. The demand for admission promises to be so great next year that the proposition of limiting the attendance seems to be seriously considered. There is such an industrial demand for the graduates that, except in the case of a few individuals who are educated under contract to enter the Government service, none of them have so far been willing to do so. I do not imagine that there is such a demand for agricultural education in Ceylon or in any other tropical British colony as there is in the Philippines, but the success which has attended the work of a college of agriculture here should certainly be a great encouragement to those interested in this project elsewhere.

Very respectfully,

E. B. COPELAND,  
Dean, College of Agriculture.

## NEW RUBBER-PRODUCING PLANT.

The following are a few particulars by the Chief of the Botanic Section of the "Secretaria del Formento" in Mexico, printed in the *Bulletin of Agricultural Intelligence and of Plant Diseases* for September, 1912, regarding a new rubber plant. This tree, unlike others, grows in hilly country in dry and stony soils. It is called by the natives "Cacaloxochitl" and belongs to the genus *Plumeria* of the family *Apocynaceae*. All the known species of this family in Madagascar produce a latex-like juice; but *Plumeria rubra* is the only one known up to now as a producer of rubber in sufficient quantity to be worth extracting.

The trunk, from 6½-16 feet high, has a girth of from 8 to 24 inches; the bark is rough and of a light gray color; the leaves are opposite; the flowers are white and large and the root is used by the natives as a purgative. *Plumeria* is common in many regions of Mexico and Central America; it grows under the best conditions in sandy, stony and rocky soils on the mountains at a height of 1000 to 4000 feet, in dry regions where there is an average yearly rainfall between 30 and 50 inches.

The following composition was found on analyzing the coagulate of the latex:

Resin . . . . .	21.9%
Moisture . . . . .	15.7%
Rubber . . . . .	25.5%

This tree is easily reproduced by slips, and in the Botanical Station of Tezonapa, four weeks after a branch had been planted, new leaflets were observed. This plant is capable of producing a good quality of rubber. Investigations are being made, and from the experiments carried out at the Botanical Station of Tezonapa indications are already available as to the best method of tapping. The ordinary system of incision would not give good results. The young parts of the plant contain a quantity of rubber in excess of that of the trunk. Lopping off the heads of the plant is advisable and extraction must be made from branches thus pruned; this pruning improves the condition of the tree and increases the growth of the branches.

## COTTON IN IMPERIAL VALLEY, CALIFORNIA.

EL CENTRO, January 25.—The cotton acreage of Imperial Valley for 1909-10, which was the first year that cotton was planted to any extent, was 350 acres, from which 175 bales were produced and sold at 14 cents a pound, or a total valuation of the crop excluding seed of \$12,250.

This satisfactory out-turn consequently led to an acreage the following season of 15,000 and a production of 6500 bales. This was also a high-priced year and the cotton was disposed of at 13.5 cents to 14 cents per pound, or a total valuation of \$446,875.

Not over 10,000 acres was harvested. In 1911-12, 12,000 acres were planted to cotton and 9600 bales produced and sold at an average price of 10.5 cents per pound, or a gross profit to the farmer of \$504,000.

On account of low prices only 8000 acres were planted in 1912-13, of which 1000 acres were abandoned which would leave actually 7000 acres, and to date 6200 bales have been ginned and a crop of 7000 bales is not an impossibility. The gross valuation for the season is \$437,500, with the average selling price at 12.5 cents.

So confident were planters over the returns of this season that Daly Bros. and Gage, the cotton buyers of the valley, estimate that 15,000 acres will be planted in Imperial Valley and 5000 acres in Lower California, which is under the same irrigation system as Imperial Valley.

There is a possibility that an acreage of over 100,000 could be planted both here and Mexico should the staple sell at anything over 12 cents during the coming year. There are over 500,000 acres suitable for cotton growing both in Imperial Valley and Lower California which is under the same irrigation system.

## THE BUDDING OF THE MANGO IN ST. LUCIA.

In a recent issue of the *Agricultural News* an account was given of recent work on the budding of the avocado in Dominica.

Information has been lately received through the Agricultural Superintendent, St. Lucia, of similar investigations carried out by Mr. Archibald Brooks, Assistant Agricultural Superintendent, on the budding of the mango.

It appears that Mr. Niles, the Junior Instructor and Overseer at the Experiment Station, Union, was the first to achieve complete success in mango-budding; but a more general investigation of the subject on a larger scale, extending over the last eighteen months, is described by Mr. Brooks in his notes, which constitute the basis of the present article.

It is pointed out, first of all, that success in mango-budding mainly depends upon the vigorous condition of the stocks. For this reason the preliminary attempts to bud both mango and avocado stocks raised in bamboo pots proved unsuccessful. Flute and T-budding and splice grafting were tried, and it was endeavored to increase the vitality of the young stocks by the judicious application of sulphate of ammonia. Every attempt proved unsuccessful; the buds remained dormant for several weeks, and in some instances the avocado buds commenced to swell, but eventually turned black.

Having at the time a large bed of vigorous one-year-old seedling mango stocks, it was decided to attempt budding them by similar methods to those employed in the propagation of oranges. The inverted T method was tried first, and the attempt proved very successful; about 60 per cent. of the buds developed and produced good plants.

It is stated that this method has an advantage over the well-known patch budding of citrus plants in that the former does not demand such a high degree of skill and dexterity; for in patch budding it is, for instance, essential that the bud be cut so as to fit the incised area of the stock in order to make a perfectly tight union. In the case of the inverted T method it is only necessary that the bud be inserted beneath the bark and firmly tied in position.

The selection of bud-wood, it is pointed out, must be confined to young woody branches. The buds should be tied in position with raffia; budding tape should *not* be used, for mango and avocado stocks, being more sappy than citrus stocks, tend to favor fungi around the wound when covered with waxed tape. This was found to be one of the causes of previous failures already referred to.

A point which next received consideration was the transplanting of the budded stock. Some of the plants were lifted and potted in bamboo joints. The results show that this can be done successfully; but it is necessary to exercise great care, and only the largest bamboo pots should be employed. It has been found that plants with unusually long tap roots should not be potted, but transplanted direct in the field. Reducing to any great extent the length of the tap root, when potting, generally results in the death of the plant.

Other plants were transplanted in a similar way to that employed in citrus cultivation, and with the same satisfactory results. The plants were forked up and all the soil shaken from their roots. The leaves were clipped and the plants transplanted to permanent positions in the field.

In concluding his notes on this useful piece of investigation, Mr. Brooks points out the several practical disadvantages attend-

ing the usual method of mango propagation, namely, inarching; and finally, it is stated that experiments are now in progress having for their object the determination of the length of time that the plants will survive between lifting and their final transplanting. The results should provide useful facts in connection with the transportation of the budded plants over long distances.—*The Agricultural News*.

## CARAVONICA COTTON.

By RUNAR OLSSON-SEFFER.

Cotton is the most important fiber that enters into the use of mankind today. It occupies more attention in the commercial world than any other product, and we hear on all sides of the great endeavors which are being made to increase its production in those countries which are growing it extensively, as well as to introduce it into new regions.

There seems to be no doubt, but that the consumption of cotton is increasing at a faster rate than its production. The world, therefore, now needs a new supply of cotton.

As it is generally accepted that a greater or less scarcity seriously threatens the cotton mills of this country on account of shortage of the raw material, having regard to the possible grave eventualities effected by the cotton pests in the Southern States, the introduction of a new variety should be encouraged.

### ORIGIN.

This has been published several times, but we shall briefly draw the reader's attention to this for the benefit of those who have not as yet heard of the tree cotton.

Ten years ago, Dr. David Thomatis began growing cotton in tropical Australia, and in order to develop a variety suited to the local conditions, he experimented with various forms of cotton, until he succeeded in obtaining a very prolific variety, now known as Caravonica cotton. It is a hybrid produced by crossing kidney and sea island cottons. The former variety is indigenous of Mexico, and the latter originated on one of the tributaries of the Upper Amazon. The Mexican variety was chosen for its length, fineness and gloss, the Amazonian for its length and strength.

The name Caravonica was adapted from the town Caravonica, situated a few miles outside of Cairns, Queensland, where the cotton was discovered. The writer had last year, the pleasure of suggesting a suitable location for a Caravonica cotton colony in Mexico to Dr. Thomatis, who resides in the southern part of Mexico at present.



## CHIEF ADVANTAGES.

Caravonica has a higher percentage of lint than is known in any other cotton, varying from 40 to 60 per cent.; a better form of tree, having no branches showing a tendency to trail on the ground; a large, freely opening boll, which allows easy and rapid picking; and, lastly, a heavy yielding capacity, which becomes more marked during the second and third year than during the first year.

Up to the present time only herbaceous cottons have been grown, which has to be replanted annually; the advantage of this variety can thus be readily seen, when a perennial bushy tree that grows to a good size can be substituted. Trees twenty feet high are common, but under cultivation the trees are pruned each year after cropping, and continue to yield profitably for from five to eight years.

## CULTIVATION AND PLANTING.

The proper cultivation of Caravonica cotton is comparatively the same as for any other crop. The land should be plowed deep and close, breaking the surface thoroughly, and should then be cross harrowed to pulverize and smooth the surface. The rows are then marked off ten feet by ten feet apart, and the soil is bedded up by running a turning plow on each side of the row. One pound of Caravonica seed contains about two thousand grains and supplies enough to plant two acres at five hundred trees per acre.

The planting should be done at the end of May or in June, in order to be able to gather the cotton in the dry season in as good condition as possible. In less than two weeks, the plants are up, and when they are four to five inches high, they should be cultivated with the hoe, after which a plow is run on each side of the bed, throwing the earth on the plants.

If the seed is properly selected, only one seed is necessary in each hole, but many planters place from two to three seeds in each hole, and then, during the first harrowing, all but the thriftiest seedling is pulled out.

The Caravonica cotton, being a hybrid, shows a tendency to vary somewhat, as is the case with other hybrids. In order to avoid this, planting of cuttings has proved to be very effective in the eliminating of crossing. However, there is no danger of this with the first planting, and by obtaining seed from a different locality little variation will take place.

## CLIMATE AND SOIL.

Cotton being a tropical plant is killed by frost, and its growth in colder climates is more or less stunted. Caravonica, however,

can be grown successfully in semi-tropical climates, that is, wherever sugar cane will grow. During the last few years, this cotton has been grown in the Hawaiian Islands, and the climate has proved to be admirably adapted to it.

The best soil for this particular cotton is loose, sandy loam permitting percolation of rain water and allowing underground water to rise by capillarity within reach of the roots of the plants. This will also allow heat and air to reach the roots more readily than dense clays.

#### ENEMIES.

Caravonica is very healthy and highly resistant to pests. This has been the experience in every country where it has been grown. A little before the rainy season, the trees should be well pruned and after cropping a severe pruning is useful in preventing the development of insect pests. This cotton seems for some reason to have less enemies than others and they appear less often and after the first year they are powerless to do great damage.

#### VARIETIES.

There are three varieties of Caravonica cotton. The first one is known as "wool," the second as "silk," and the third as "Caravonica kidney." The first one yields a very strong, rough, but regular fiber; the second produces silky and long staple with great strength; and the third or kidney variety is very similar to the sea island cotton, except that the plant is as large as the former and also being a perennial plant. The wool Caravonica derived its name on account of being serviceable for mixing with wool, while the silk variety was advantageously used with silk.

#### HARVESTING AND YIELD.

This cotton is easy to pick on account of the large size of the bolls, running about fifty to a pound. The bolls open well but hold the seed firmly, so that it does not easily blow off; and the crop lasts about five to six months.

Each tree ought to yield from eight to fourteen pounds of bolls of fifty or sixty per cent. lint, and Dr. Thomatis stated that his average yield has been from one thousand to one thousand two hundred of clean lint to the acre. The wool variety has yielded over sixty per cent., the silk variety fifty per cent., and the Caravonica kidney over forty-five per cent. lint. With three hundred or five hundred bolls each tree bears from four to seven pounds of seed cotton; and on the average one hundred ten bolls will give one pound lint and one pound seed. In Australia, Caravonica has yielded somewhat over one thousand two hundred pounds clean lint per acre, while the average in this country is about five hun-

dred pounds seed cotton to the acre. Unlike the Upland cotton, which possesses seed covered with short lint, and is white in appearance, Caravonica has clean black seed similar to the Egyptian, and is ginned by the roller gins, and not by means of saw gins.

#### CONCLUDING REMARKS.

To sum up, the high percentage of lint and its good length, combined with its drought-resisting qualities and the good form of the tree, highly recommend the Caravonica cotton as the future standby to the cotton growers in the Southern States.—*Review of Tropical Agriculture (Mexico)*.

#### A NEW GROUP OF FUNGI ON SCALE INSECTS.

In the *Annals of Botany*, Vol. XXV, No. XCIX, p. 842, there appears an interesting note by Petch entitled "Note on the Biology of the Genus *Septobasidium*." The writer points out that in this genus are included a fairly well defined group of Basidiomycetous fungi formerly classified under the genera *Thelephora*, *Corticium* and others related to these. The members of the group occur mainly in tropical countries and are found as a rule encrusting the living branches and leaves of plants up to a height of 10 feet or more from the ground. The variously-colored sheets of fungus often cover these parts for a distance of several feet, but they never kill them or cause any noticeable injury. The question therefore that naturally arises is upon what do these fungi live, since they do not appear to be parasitic on the plants on which they grow.

From an examination of a long series of specimens, Petch concludes that they are parasitic on scale insects, not, as in the case of the well-known local forms, on individuals, but upon whole colonies. This fact is of considerable interest from a local point of view, because at least two species of the genus *Septobasidium* occur fairly commonly in these islands. The first is one described under the name *Thelephora pedicellata*, in the *Agricultural News*, Vol. IX, p. 286. It is very common on lime trees in St. Lucia and forms violet-grey, waxy patches on their branches; the patches are often of considerable extent. In the description referred to it is stated that the presence of the fungus is often associated with the death of the parts affected; but it is also true that very frequently, as recent examinations have shown, the fungus may be present in large quantities without causing any apparent injury. The association of this fungus with scale insects that looked healthy is also recorded in the same place, but almost certainly the presence under the older parts of the fungus of numerous dead insects was overlooked. It appears, therefore, that this fungus

which is so universal in the island mentioned is not harmful but useful; and that when the parts of the trees upon which it is growing die, their death is due to some other cause, very possibly the harmful effect of the scale insects brought about before the fungus has had time to overcome them. Another species, almost certainly belonging to the same genus and having probably the same parasitic habit on scale insects, forms dark-brown sheets also on lime trees and covers colonies of scale insects in the same way as that first mentioned. It has been found in Antigua and Dominica, but has not yet been identified. It seems quite possible that one or two other species of the same kind may exist in the West Indies.—*The Agricultural News*.

### THE MOST IMPORTANT THING.

(By MARK SULLIVAN in *Collier's Weekly*.)

*There is no more important subject now pending before Congress and the country than the adoption of a definite and comprehensive water-power policy.*—From the Annual Report of Walter L. Fisher, Secretary of the Interior, issued in December.

*In my opinion, no question now before the Government is more important than the attainment of a proper solution of this question.*—From the Annual Report of Henry L. Stimson, Secretary of War, issued in December.

*Concerning no subject of legislation is there a more imperative need of a definite and comprehensive policy than in relation to the development and control of water power.*—From a speech delivered by Theodore Burton, Senator from Ohio, on August 14, 1912.

\* \* \* \*

It takes pains, and art in the use of words, to make clear just why a water-power monopoly belongs in a wholly different class from any other kind of monopoly; and no amount of clearness in the use of words will accomplish it unless the reader has the imagination to see the relation which water power is going to bear to the civilization of the future. The most distinguished electrician in the United States, one of the few men whose unique qualities entitle them, in a literal and exact sense, to be described as geniuses, has said that a time is coming in this country when there will be no such thing as a *running* stream. He says that every drop of water will be stored in dams and reservoirs, and its fall toward the sea will be permitted to take place only at high dams where power will be generated for every form of labor in every household, not merely for running railroad trains and factories, but for cooking and ironing and the routine duties of homes. The man who has thus pointed out, in an extraordinary

detail of vision, just what water power is going to mean to future generations is Charles Pröteus Steinmetz, and his office is consulting engineer of the General Electric Company, one of the very concerns most likely to be the great monopolist of water power if monopoly is going to be permitted. It is said that the General Electric Company controls about thirty-five per cent. of the water power so far developed in this country. The same thought has been expressed, though with less eloquence and breadth of vision, by a report of the Inland Waterways Commission:

"Wherever water is now or will hereafter become the chief source of power, the monopolization of electricity produced from running streams involves monopoly of power for the transportation of freight and passengers, for manufacturing, and for supplying light, heat, and other domestic, agricultural, and municipal necessities, to such an extent that *unless regulated it will entail monopolistic control of the daily life of our people in an unprecedented degree.*"

\* \* \* \*

#### TAFT'S VIEWS.

It is well known in Washington that Mr. Taft's persistently correct course in regard to the water-power question is due to two members of his Cabinet, Secretary Stimson of the War Department and Secretary Fisher of the Interior Department. These men take a thoroughly enlightened position: they want the water power developed; they want it developed by private capital; they want a sufficient reward held out to that capital, even including some possible speculative reward; *but they insist that enough power be retained in the Federal Government to prevent the amalgamation of all these power sites into one great monopoly, and also that there shall be opportunity from time to time to readjust the valuation of these sites.*

#### DIVISION OF ANIMAL INDUSTRY.

HONOLULU, January 8, 1913.

HON. W. M. GIFFARD, President and Executive Officer, Board of Agriculture and Forestry.

Sir:—I have the honor to report on the work of the Division of Animal Industry for the month ending December 31, 1912, as follows:

#### THE MILK ORDINANCE AND ITS ENACTMENT.

I beg to call the Board's attention to the fact that the municipal milk inspector, Mr. Joe Richards, has been retired from his position and another man appointed in his place. Mr. Richards has been delegated for the past two and one-half years to assist this

Division in the tuberculin testing of the dairy herds of the City and County of Honolulu, and to replace him with an absolutely inexperienced man would practically mean to put a stop to the co-operation of this Board with the Board of Supervisors, as it is beyond reason to expect us to begin to break in a new man to do work which it will require at least one year for him to become familiar with. The milk ordinance requires that the tuberculin testing of the herds belonging to the applicants for permits to sell milk shall be made without cost to the owner. This test has been assumed by the Board of Agriculture and Forestry on the condition that the Board of Supervisors provide an assistant, and so long as the work did not divert the time and attention of such an assistant from the supervision and inspection of the local dairies but on the contrary provided him with transportation to these places, it was decided that the official milk inspector be assigned to assist with the testing. This arrangement, which has saved the Board of Supervisors the cost of testing between 5000 to 6000 head of cattle annually, has proved immensely satisfactory, and it is but due Mr. Richards to state that the gratifying results are due to a large extent to his interest in and ability to do the work required of him. He has, as stated, given his whole time and attention to the work and has studied, not alone the conditions pertaining to it, but the character and idiosyncracies of each individual milk producer, with the satisfying result that the milk supply of the City and County of Honolulu may be said to be one hundred per cent. better than what it was two years ago. To drop Mr. Richards now and replace him with an absolutely inexperienced man can certainly not be to the best interests of the service and must necessarily place an unwarranted amount of unnecessary work on the shoulders of the officers of this Division who will have to train and educate him to do Mr. Richards' work.

I would therefore respectfully suggest that your honorable Board make such representations to the Board of Supervisors as will insure the continued services of Mr. Richards at least so far as his assisting with the animal tuberculin test is concerned. This work, which, as stated, devolves upon this Board only by consent, and which, likewise, embraces the securing, injection, examination and either branding or ear-tagging of between 5000 and 6000 head of cattle, was begun today, for the fourth time, with the injection of about 175 head belonging to Mr. Isenberg. In view of the public announcement of the appointment of a successor to Mr. Richards I went along to see the work done, and I came to the conclusion that the technique of the intradermal injection as well as the subsequent tagging and branding is much facilitated by the assistance of an experienced man.

Mr. Richards will remain in office until the 15th inst., it being understood that the remaining week is to be devoted to the instruction of the new appointee in his future work. There being

in the neighborhood of one hundred dairies in the county, the status of each of which may be a matter of record, at least in so far as the present incumbent is concerned, it is easily seen that the accumulated experience of two and one-half years of observation of conditions and enforcement of an ordinance containing some two dozen specific stipulations, cannot be transferred in a week, however diligent and willing both sides to the transfer might be, and leaving entirely out of consideration the acquirement of proficiency as assistant to the tuberculin testing officer.

In conclusion I beg your pardon for having gone into this subject at such length, but I consider the milk problem and everything pertaining to it of the greatest importance, when it comes to the conservation of the health of the community, and I consequently trust that your honorable Board will assist me in retaining the services of Mr. Richards.

#### QUARANTINE STATION.

I have to call attention to the fact that the dog division of the Quarantine Station is full and that the arrival of a large number of troops in the near future may prove embarrassing in case they should be accompanied by the usual number of dogs. During the last month the eighteen kennels have accommodated at least twenty-one dogs and at times more, and so long as there seems to be no diminishing in the prevalence of rabies in the Coast States of the mainland there can be no excuse for abating our vigilance in regard to the introduction of this disease.

The digging habit has unfortunately spread among the present lot of dogs to such an extent that it has become necessary to keep nearly every one of the animals chained up constantly. Twice dogs have escaped, having dug under the footboards, but were fortunately apprehended before they got away. Unless some other method can be suggested, I believe it will become necessary to pave the enclosures or else to macadamize them in such a way as to prevent digging.

Portable reinforcements for a limited number of kennels must also be provided, as it is doubtful whether the present enclosures would retain a dog if it developed rabies. A visit to the station by the members of the Committee on Animal Industry is respectfully suggested.

#### THE ANNUAL REPORT.

The writing of the report for the past two years has occupied the principal part of my time during the past few weeks. Unfortunately work of many natures has crowded in upon the Division, as for instance the endemic at Mr. Lyman's place near Pupukea, Oahu, and which has caused the death of nine animals during the

past week or ten days, and which has required two visits so far. The fact that it is intended to announce in this biennial report a new and simple method for testing horse stock for glanders has necessitated the examination of hundreds of pamphlets and periodicals in order to be sure that the same is original. The report of the Deputy Territorial Veterinarian at Hilo has been received and the two other ones are expected to arrive shortly.

#### REPORTS AND CORRESPONDENCE.

The monthly report of the Assistant Territorial Veterinarian is appended herewith, together with copies of a number of letters written or received from the Deputies on the other Islands and pertaining especially to the extension of the tuberculosis control work to their districts.

Respectfully submitted,

VICTOR A. NORGAARD,  
Territorial Veterinarian.

#### REPORT OF ASSISTANT VETERINARIAN.

HONOLULU, Hawaii, January 9, 1913.

DR. V. A. NORGAARD, Chief Territorial Veterinarian, Honolulu,  
T. H.

Sir:—I have the honor to submit the following report for the month of December, 1912:

#### *Tuberculosis Control.*

Thirty-nine cows, 12 heifers and 4 bulls constituting Mrs. Isenberg's dairy at Waialae were submitted to the intradermal tuberculin test with the result that one was condemned out of a total of 55 head. The condemned cow had been purchased from P. M. Pond some time previous and at the time of purchase had successfully passed the test. The animal was at once removed from the herd and sent to slaughter and the stall carefully disinfected. After a period of three or four months this herd should again be submitted to the test and should then show a clean record.

In my report for the month of November I made the statement that the cow condemned in the dairy of H. B. Brown came from the Swanzy ranch at Kualoa; this is an error due to confusing brand marks, and I take this opportunity to rectify it. The animal in question was purchased from a Chinaman who keeps a small herd at Kalae and was not purchased from Mr. Swanzy's ranch.



*Intradermal Mallein Test.*

This new and original method for the detection and diagnosis of glanders was applied to three mules consigned to the Quartermaster's Department and which had come from Seattle without test certificates. The injection was made in the side of the neck on the afternoon of December 19. Examination on the following afternoon revealed only very slight swellings which were practically painless. These animals were examined again on the 21st and allowed to proceed to Fort Shafter, as they had successfully passed the test and so proven to be free from infection.

A small mule owned by Mrs. H. Harrison arriving here December 24 on the S. S. *Wilhelmina* was subjected to the intradermal mallein test at the Quarantine Station. The injection was made December 27 at 8:30 A. M. When examined at 5:15 P. M. of the same day no swelling was observable. As there was no indication of a reaction the animal was passed as sound.

One of the main features of the intradermal method of testing is its rapid action; the hyper-sensitive tissues of an infected animal will begin to produce a characteristic reaction six to eight hours after injection, consequently an animal injected at seven or eight o'clock in the morning may be proven diseased or otherwise by evening.

*Importations.*

The following live stock has entered this Territory through the port of Honolulu during the last month:

December 5—S. S. *Zealandia*, Sydney: 2 English bulldogs, J. H. Kelley. These were two very superior animals, one brindle and one fawn colored, and will greatly add to the value of Mr. Kelley's kennel. Due to the fact that Mr. Kelley had applied for a permit to import these animals and to the fact that they were accompanied by proper certificates of health, they were allowed to enter this Territory free from quarantine restrictions.

December 4—Honolulan, San Francisco: 1 horse, H. Rawley; 20 mules, Hilo; 7 crates poultry; 1 crate guinea pigs, 1 crate hares, U. S. Experiment Station.

December 5—Transport *Dix*, Seattle: 54 horses, 6 mules, Quartermaster's Department; 1 dog, Lieut. Keiffer; 1 dog, Lieut. Rogers.

December 6—Mongolia, San Francisco: 1 white Spitz dog, Mrs. M. D. Gear.

December 9—Sierra, San Francisco: 1 dog, Mrs. W. Pullar; 17 crates poultry.

December 8—Lurline, San Francisco: 1 horse, Wm. Campbell; 16 crates poultry.

December 22—Missourian, San Francisco: 26 horses, C. Belina; 3 horses, Quartermaster's Department.

December 23—Sonoma, San Francisco: 4 crates poultry.

December 24—Wilhelmina, San Francisco: 26 crates poultry; 1 dog, Mrs. Jamic; 1 mule, Mrs. H. Harrison.

December 31—Honolulu, San Francisco: 3 horses, H. Hackfeld & Company; 26 mules, Volcano Stables; 1 horse, Rosenberg Tank Company; 1 dog, George Kaupena.

Respectfully submitted,

LEONARD N. CASE,  
Assistant Territorial Veterinarian.

## DIVISION OF ENTOMOLOGY.

HONOLULU, December 31, 1912.

HONORABLE BOARD OF COMMISSIONERS OF AGRICULTURE AND  
FORESTRY, Honolulu, Hawaii.

Gentlemen—I respectfully submit my report of the work of the Division of Entomology for the month of December, as follows:

During the month there arrived 44 vessels, of which 22 carried vegetable matter and one vessel carried sharp sand for concrete work. The usual careful inspection was made with the following results:

	Lots.	Parcels.
Passed as free from pests.....	1,576	37,019
Fumigated . . . . .	81	2,343
Burned . . . . .	81	99
Returned . . . . .	1	96
	<hr/>	<hr/>
Total inspected . . . . .	1,739	39,557
The parcels were received through the following channels:		
By mail . . . . .	145	
“ baggage . . . . .	156	
“ freight . . . . .	39,256	
	<hr/>	39,557

## RICE SHIPMENTS.

During the month 26,192 bags of rice arrived from Japan which were found free from weevil and were passed.

## PESTS INTERCEPTED.

Eighty packages of fruit and 14 packages of vegetables were found in the baggage of passengers and immigrants from the

Orient. These being prohibited, they were destroyed by burning.

One queen bee arrived from Texas and, finding it dead, we burned the package and contents.

In the soil around plants from Japan we found three distinct species of *Melolonthid* grubs, one being an *Anomala* species. This group of insects are exceedingly injurious to vegetation and are closely allied to the Japanese beetle.

On a shipment of pinetree twigs sent here from Japan for New Year decorations I found an *Aphis* (*Lachnus* species), a very common pest in Japan, and fumigated the shipment for a few hours before letting it go.

Three species of Ants (*Tetramorium guineense*), (Sydney); (*Monomorium pharaonis*) and a *Cremastogaster* species (Japan), were taken in soil and on vegetables during the month.

#### HILLO INSPECTION.

Brother M. Newell reports the arrival of 6 vessels, 5 of which brought vegetable matter. In a letter he reports that the shipments received this month are the heaviest ever received at Hilo. There were 325 lots, consisting of 6908 packages. Fifty bags of potatoes were cleaned of soil before delivery, and three crates of celery were treated for the celery fungus.

#### INTER-ISLAND INSPECTION.

During the month of December 62 steamers were attended to and the following shipments were passed:

Plants (mostly forestry trees).....	66 packages
Taro . . . . .	768 bags
Lily root . . . . .	34 packages
Vegetables . . . . .	8 "

Total inspected and passed..... 876 packages

The following packages were refused shipment:

Various fruits . . . . .	16 packages
Plants . . . . .	12 "
Vegetables . . . . .	1 package

Total inspected and refused shipment 29 "

For several months reports have come to the office of the serious damage done to some of our native ferns, *Sadlerias* and others, by the attack of the Australian fern weevil (*Syagrus fulviterius*), which was accidentally introduced here a number of years ago. This beetle is, unfortunately, already well established in the ferneries and on the mountains back of Honolulu. Brother

Matthias Newell had reported the pest in a fernery in Hilo several years ago, but we have heard nothing more about the matter since. Knowing about the serious damage that this beetle is now doing in the forests around Tantalus and other localities on this Island, and fearing that if established in ferneries at Hilo it would sooner or later escape into the open and get into the fern forests which are so essential for the conservation of rainfall, I submitted the question to the President of the Board of Agriculture and Forestry and suggested to him to allow me to send Mr. D. B. Kuhns, Assistant Inspector, to Hilo, to make a thorough investigation, to which he heartily agreed. The following is Mr. Kuhns' report:

HONOLULU, Hawaii, December 31, 1912.

MR. EDWARD M. ELIHOORN, Supt. of Entomology, Board of Agriculture and Forestry, Honolulu, T. H.

Dear Sir:—According to your instructions to investigate the fern weevil, (*Syagrus fulviterius*, Pascoe), which was reported found at Hilo several years ago and which is now causing great damage to ferns on the mountains back of Honolulu, I left Honolulu December 21, arriving at Hilo on the morning of the 22nd. On arriving I lost no time getting in touch with Brother M. Newell, who had found this fern weevil in a greenhouse some years ago, so as to ascertain the exact locality and from there make my investigations. Brother Newell kindly offered to accompany me to the place where he first observed the pest, namely, on Reed's Island.

A careful search was made of the greenhouse in question and of all ferns in the yard, but there was no evidence whatever of the work of *Syagrus*. From here we visited five other places as well as the ferns along the banks of the Wailuku river.

The *Sadlerias* and *Cibotium* tree ferns, as well as *Aspidium* and the Boston ferns, were commonly found out of doors, while in the greenhouses the various species of Maidenhair were commonly found. The two first named are the most common outdoor food plants of the pest, whilst it is quite partial to Maidenhair in the greenhouses. Being unable to find the weevil on Reed's Island and adjacent regions, I determined to visit higher elevations which might possibly have become infested. Accordingly, on the 25th of December I visited Pihonua, making a careful search from Rainbow Falls to an elevation of 1500 feet.

Having made close observation of the work of the weevil on the leaf stems of *Sadleria* on Tantalus, I paid particular attention to the fronds of these ferns, but found only the young fronds to be damaged to some extent by a fungus disease and the dying fronds and heart of the fern riddled by the larvae of the *Tineid* moth, *Brevitus*. There is no evidence, however, of *Brevitus* injuring healthy plants. The *Cureulionid* beetle, *Pseudolus*, is quite common in the dead stems of the tree ferns, but I failed to find

where it had molested living fronds. *Pulvinaria psidii*, a cottony scale insect, is found in some localities quite heavily infesting *Cibotiums*, and its presence was conspicuous by the black fungus which covers the fronds. None of these endemic insects are known to materially injure the ferns in question.

December 26. The day was spent inspecting greenhouses and yards in Puueo and the ferns along the streams to Wainaku. Conditions here were much the same as in the other localities visited.

December 27. Examined the ferns in Kaumana to an elevation of 1500 feet. Conditions here were exactly as in Piihonua.

December 28. Examined the ferns in yards, greenhouses, and along the Volcano Road through the Waiakea Plantation, finding all remarkably free from insect injury. Two greenhouses were quite badly infested with mealy bug (*Pseudococcus longispinus*), which attacks Maidenhair.

December 29. The ferns in the forest at Kaiwiki were examined up to an elevation of 2000 feet. The ferns in this district are in perfect condition, there being no evidence of injury by insect or fungus disease.

December 30. Made a trip to the forest on the low, flat plain in the direction of Leleiwi Point, a distance of about four miles from Hilo. The *Sadlerias* comprise the larger part of the fern forest and these were free from insect injury, an occasional patch of ferns being slightly damaged by fungus.

During my stay in Hilo I visited seven localities, besides inspecting the ferns and plants in 36 greenhouses and yards about Hilo, and am pleased to report that I found no evidence of the existence of the fern weevil (*Syagrius fulvitarisus*) in any of the places visited.

Indications point to the fact that Brother Matthias Newell, who discovered the infestation, acted wisely in submerging the infested plants in water, destroying the beetles as they came to the surface, thus preventing the weevils from obtaining a foothold.

The cultivated ferns were remarkably free from insect injury and disease. Only a few instances of injury to Maidenhair fern by mealy bug (*P. longispinus*) were noted.

In the wild ferns the only noticeable injury is caused by a fungus which attacks the young fronds of *Sadleria*, and when so diseased they become infested with the larvae of the *Tineid* moth, *Ereunitus*. *Pseudolus* is frequently found in the dead and decaying fronds of *Cibotium* and *Sadleria*. All of the smaller ferns are absolutely free from injury of any kind.

Respectfully submitted,

D. B. KUHN,  
Assistant Inspector.

Mr. Kuhns is very well posted on the work of this weevil and it is gratifying to know that he was unable to find the pest in all the localities visited. No doubt Brother M. Newell did the very best thing when he destroyed the weevils he found on Reed's Island. The same method he then used has been used by many people in Honolulu who grow ferns in inclosures with usually very good results. Once this weevil escapes into the open forest, however, there is absolutely no hope of a check, and the damage to fern vegetation already noted on Oahu will have a great bearing on the forest cover and future water supply.

I believe that some action should be taken by the Board of Commissioners relative to the shipping or taking of ferns from Oahu to the other islands. The Board should also cause an investigation to be made of the general spread of the fern weevil throughout the Islands. Ferns have been taken to all of the other islands in the past, and if this pest has been introduced with the ferns we should know it. It might not be too late to check it as did Brother Newell at Hilo before it gets into the open forests which are so essential for the conservation of water. The damage done to the various ferns soon causes their death, and as much of our forest undergrowth consists of many varieties of ferns, there is every possibility that great damage to the forest cover will result if the beetle is introduced. Once the forest ground cover is destroyed, the water supply will be materially shortened because of the run-off. Where now the spongy undergrowth formed by ferns, mosses and other vegetation retains the heavy rains and allows them slowly to percolate into the soil and substrata, when destroyed, the heavy downpour will rush down the mountain sides into the ravines and gulches and thence into the ocean, taking with it much debris and soil. Such damage can now be noticed on the slopes of Tantalus. We have not been able to ascertain as yet how many of our native ferns are attacked by the weevil, and I believe that this should be studied as soon as possible, even if it should require a special man for the work.

Respectfully submitted,

E. M. EMRIORN,  
Superintendent of Entomology.

## DIVISION OF FORESTRY.

HONOLULU, January 8, 1913.

HON. W. M. GIFFARD, President, Board of Agriculture and Forestry, Honolulu, Hawaii.

Sir:—I have the honor to transmit herewith the report of the Forest Nurseryman covering the work of the Division of Forestry for the month of December, 1912.

Very respectfully,

RALPH S. HOSMER,  
Superintendent of Forestry.

## REPORT OF FOREST NURSERYMAN.

HONOLULU, December 31, 1912.

R. S. HOSMER, ESQ., Superintendent of Forestry, Board of Agriculture and Forestry, Honolulu, Hawaii.

Dear Sir:—The following is a report of the principal work done during the month of December:

*Nursery.*

	In Seed Boxes.	In Boxes Transplanted.	Pot-grown.	Total.
Sold . . . . .		600	63	663
Gratis . . . . .	5,000	1,400	1,290	7,690
	5,000	2,000	1,353	8,353

*Collections.*

Collections on account of plants sold amounted to \$7.40.

*Hilo Nursery.*

Brother Matthias Newell, in a letter dated January 2, states that he has distributed from his Nursery in Hilo 1500 trees in transplant boxes since Arbor Day and the total for 1912 amounted to 12,490 trees, the largest number for any year since the Nursery was started.

*Fire on Ridge, Ewa Side of Kalihi Valley.*

At 3 P. M. on December 15, 1912, a brush fire was reported to be raging on the Ewa side of Kalihi Valley. The writer went

at once to it and with the aid of a gang of prisoners kindly sent by Sheriff William Henry and five firemen sent by Chief Thurston of the Fire Department, we succeeded in putting it out after about two hours' hard fighting. A special report on this fire under date of December 16 was handed to the President and Executive Officer.

### *Congressional Vegetable Seed.*

Thirty-five mail bags containing about 10,000 packages of vegetable seed were received from Washington. About one-half, or 5000 packages, marked "V-4," contains corn, cucumber, lettuce, onion and radish. The other 5000 packages, marked "V-6," contain lettuce, muskmelon, onion, radish and tomato.

### *Plantation Companies and Other Corporations.*

Under this head we have distributed 10,000 plants in seed boxes, 6250 in transplant boxes, ready to set out, and 100 pot-grown. We have not received any large orders during the month.

### *Experiment Garden, Makiki.*

The two men have been transplanting seedlings, mixing and sterilizing soil and doing other routine work.

### *U. S. Experimental Planting, Nuuanu Valley.*

The man has been hoeing and clearing away grass and weeds from the smaller trees, also transplanting trees from seed boxes to leaf pots.

Very respectfully,

DAVID HAUGHS,  
Forest Nurseryman.



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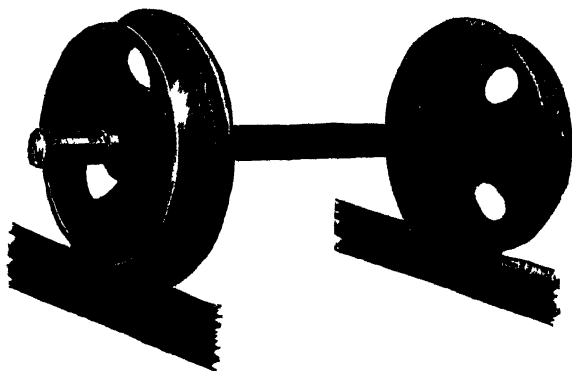
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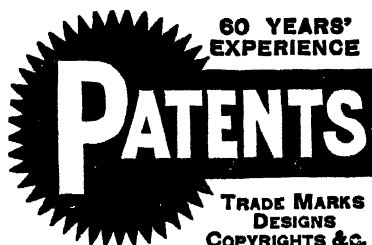
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# THE HAWAIIAN FORESTER AGRICULTURIST

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VOL. X.

FEBRUARY, 1913.

No. 2.

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Some idea of the damage and destruction of useful vegetation from which these islands are undoubtedly saved through the skill and the vigilance of the Division of Entomology, in keeping pests that are constantly being brought to the gateways of our commerce from entering, may be obtained from any of the monthly reports of the Territorial entomologist. Some notable instances will be found in the report of Mr. Ehrhorn for January in this number.

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An article on starting right in the hog business, copied elsewhere from the Live Stock and Dairy Journal, is commended to small and large farmers in Hawaii.

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As part of the aim of the Forester is to present suggestions for new agricultural products of commercial value, an article is reprinted in this number from Consular Reports on esparto grass for paper making.

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An interesting article is given elsewhere on valuable forest trees of Chiloe Island, Chile, from Consular Reports. Several trees to which peculiarly valuable properties are attributed are briefly described. Mention may be made of the canelo, of beautiful foliage and yielding lumber immune from rats and vermin, also various trees with special merits for manufactures.

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Through the kindness of Mr. Wilbur A. Anderson, manager of the Nahiku and the Hawaiian-American rubber companies operating on the Island of Maui, the Forester is enabled to present some preliminary information respecting the First Cotton, Fibre and Tropical Products Exhibition, also the Fourth International Rubber Conference, both of which are to be held in London in June of 1914. It is to be hoped that the organizations and individuals engaged in the diversified industries of Hawaii, as distinguished from the sugar industry, will come together and make arrangements for having such industries properly made known to the world in London. As Mr. Anderson said, in his reports to the stockholders of the rubber companies mentioned, a serious mistake was made in failing to take adequate advantage of the

rubber exhibition in New York last year. Mr. Anderson ably represented the islands on that occasion, but he was not backed as he should have been either by money, assistance or material. The Philippines were enabled to out-show Hawaii, while other rubber producing countries threw it into eclipse. It will be an oversight of the present Legislature greatly to be regretted if it does not provide something for a Hawaiian exhibit in London next year.

This number of the Forester has been delayed owing to causes beyond the control of the editor, the same as delayed the January number.

From the report of the Superintendent of Forestry in this number, it will be seen that the reforestation of these islands is advancing in great strides. The manner in which the sugar planters are taking up tree planting is particularly gratifying, their large resources enabling them to set an example of striking dimensions to smaller landholders. It is safe to say that the tree-planting in Hawaii during the past and the present decade will have created millions of dollars' worth of assets, while the preservation of old forests and the conservation of water, in the many forest reserves established, are of inestimable value.

Later official reports of the cattle distemper at Pupukea, Oahu, described by Dr. Case in his report elsewhere, indicates that it was not one of the contagious animal plagues, but was caused by poisonous growths eaten by the cattle when their pasturage was destroyed by drought.

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## HAWAII NOTIFIED OF LONDON EXHIBITION NEXT YEAR.

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The following letter and enclosure of advertisement of the events mentioned are self-explanatory, but comments deemed fitting are made upon them elsewhere:

Exhibition Offices,  
75 Chancery Lane (Holborn),  
London, W. C., 2nd Jan., 1913.

Wilbur A. Anderson, Esq., Nahiku Rubber Co., Ltd., Nahiku,  
Maui, Hawaiian Islands.

Sir:—I beg to advise you that the Fourth International Rubber and Allied Trades Exhibition will be held in London in June of 1914, and during the same time, but in a building adjoining, the First Cotton, Fibre and Tropical Products Exhibition will be held. This means that all countries will be able to exhibit the whole of their products.

During the Rubber Exhibition the Fourth International Rubber Conference will take place.

During the progress of the Cotton and Fibre Exhibition there will be an International Conference of Tropical Agriculturists, of which Professor Wyndham Dunstan, Director of the Imperial Institute, is President.

His Majesty King George V is Patron of the Exhibition; Sir Henry A. Blake, G. C. M. G., is President, and the Right Hon. Lord Elphinstone Vice-President.

I shall be glad if you will kindly join the Honorary Advisory Committee, which will be without responsibility or liability to yourself.

Trusting to receive a favourable reply, I am,

Yours truly,

A. STAINES MANDERS,  
Organising Manager.

(*Enclosure.*)

First International Cotton, Fibre, Tropical Products and Allied Trades Exhibition. London, June, 1914.

#### OBJECTS.

To bring together the Raw Products in every form: Cotton, Fibre, and allied articles.

Every description of Tropical Products, with the exception of Rubber.

All descriptions of Machinery and Appliances required by the Producer, etc.

All the Appliances necessary for the Manufacture: Machinery, Chemicals, etc.

Every description of Goods manufactured from Cotton, Grass, Fibre, etc.

International Conference of Producers, Manufacturers, etc., for the exchange of ideas, etc., on somewhat similar lines to the International Rubber Exhibition Congress.

Further particulars will be announced in due course.

A. STAINES MANDERS,  
Organising Manager.

MISS D. FULTON,  
Secretary.

Offices:—75 Chancery Lane, London, W. C.

## THE BIENNIAL REPORT

(From the Pacific Commercial Advertiser.)

There has just come from the press the biennial report of the Board of Commissioners of Agriculture and Forestry for 1911 and 1912. It is a book of 258 pages, illustrated by thirty-six full-page illustrations, and covers in detail the activities of the three divisions of the board during the past two years.

First is the report of the commissioners—Messrs. W. M. Giffard, H. M. von Holt, J. M. Dowsett, Albert Waterhouse and Arthur H. Rice. This gives, under the heading of each division, a brief review of the salient points in the work accomplished in entomology, forestry and animal industry, with a summary for each division of the especial needs for the future. The report of the commissioners, having been issued separately a short time ago, in advance of the full report, has already been reviewed in these columns, but it may be said here that in its twenty pages are summarized the facts set forth more at length by the several superintendents.

Following the report of the commissioners are tables showing expenditures and a paper presented by W. M. Giffard to the joint committee on forestry of the Hawaiian Sugar Planters' Association and the Board of Agriculture and Forestry, entitled "Some Observations on Hawaiian Forests and Forest Cover in Their Relation to Water Supply," a comprehensive statement of the underlying reasons why our local watersheds should be well protected.

## DIVISION OF FORESTRY.

The section allotted to the Division of Forestry consists of reports by the superintendent of forestry, Ralph S. Hosmer; the forest nurseryman, David Haughs, and the consulting botanist, Prof. J. F. Rock.

Mr. Hosmer briefly outlines the reasons for practising forestry in Hawaii and argues for the better protection of the forests on the watersheds, especially through fencing, that they may be made more surely to produce their most important crop, water. During the past two years four new forest reserves were set apart in South Kona, and in Puna, Hawaii, on Molokai, and in Kula, Maui. There are now twenty-seven forest reserves in the Territory with a total area of 683,101 acres, of which sixty-seven per cent., 454,810 acres, is government land.

Passing to the second main line of forest work, the encouragement of tree planting, it is shown that in the past two years more seedling trees than ever before were distributed from the Division of Forestry nurseries at Honolulu and the sub-stations at Hilo,

Hawaii, and Homestead, Kauai, the totals being 620,739 for 1911, and 806,537 for 1912.

Tables follow showing the total number of trees reported planted by sugar plantation companies and other corporations throughout the Territory. For 1911 the figure is 1,134,940; for 1912, notwithstanding that it was a phenomenally dry year, 1,303,698. When these figures are compared with 1908, when 498,677 trees were reported set out, the increase of interest in tree planting in Hawaii is very apparent.

Some space is given to experimental forest planting and to plant introduction work, which it is recommended be given more attention.

#### FORESTRY NEEDS.

The needs of the Division of Forestry are summed up as follows:

The better protection of the native forests needed for watershed protection, essentially through fencing and the killing off of wild stock.

Better provision for getting seedling trees and plant material into the hands of those who want to do forest planting, through the establishment of additional sub-nurseries.

The extension of experimental planting with particular reference to the introduction of plants that will supplement the native forest of the wet districts.

The actual planting of areas of government land in various parts of the Territory.

The continuation and strengthening of the existing policies of the Division of Forestry regarding the protection of the forests from fire and the giving of advice and assistance to owners of forest land.

Mr. Haughs' report deals in detail with the work at the government nursery and the giving of advice and assistance to persons desiring to plant trees. It also has an account of the introduction and propagation of the basket willow, which gives promise of some day becoming the basis of a new local industry.

Mr. Rock, botanist, tells of finding new species of plants on the Island of Hawaii and gives further notes about the native Hawaiian rubber-producing tree that he discovered at Puuwaa-waa. The illustrations show typical forest scenes and the work being done at the Division of Forestry nurseries.

#### DIVISION OF ENTOMOLOGY.

E. M. Ehrhorn, superintendent of entomology, in the next section of the report, outlines succinctly the work of his division in keeping insect pests from gaining entrance to Hawaii. The importance of this work is manifest, and even to one unacquainted



with entomology the long list of insects intercepted (pp. 122-126) is an impressive showing of what the Islands have escaped.

At Honolulu and Hilo 991 vessels were boarded during the period, and plant or other vegetable matter was found on 556 of these. This shows an increase of eighty-eight vessels boarded and of seventy-two vessels bearing vegetable matter over the previous biennial period. During 1911 and 1912, there were inspected 204,059 and 280,930 packages respectively of fruits, vegetables and plants, making a total for the two years of 484,899 packages. As compared with the same period for 1909-1910, there was shown an increase of 97,928 packages inspected. Owing to the very rigid inspection by the entomological officials a very marked improvement in the quality of fruits and vegetables coming from the mainland has been noticeable.

The tables illustrating the inspection work bring home to one the large quantities of fruits and vegetables that are annually imported, and, incidentally, are an argument for the raising of more of these products locally.

Owing to the fact that Honolulu is the main port of entry for the Territory the importance of inter-island inspection is easily seen as an adjunct to the general horticultural inspection, because should ever any pest be accidentally introduced at Honolulu, its spread to the other islands can thus be more effectively guarded against, if not absolutely prevented. The thoroughness with which this can be done depends on the efficiency, and consequently on the extension, of the inter-island inspection. Recent rules having to do with this matter are reprinted for the better information of the public.

#### FRUIT FLY PARASITE.

In view of the recent discovery made in Africa by Dr. F. Silvestri, the entomologist employed by the Board of Agriculture and Forestry for this purpose, of a parasite for the Mediterranean fruit fly, the portion of the report dealing with fruit fly control will be read with greater interest. Not only has the control work reduced this serious pest, but even the casual observer will have no difficulty in noticing a direct improvement as to present conditions in general, in comparison with those existing two years ago.

This goes to show that a clean culture campaign, or the cleaning up of premises, it does not matter for what particular pest, means much to any community, and especially to Honolulu, where horticultural conditions are entirely different from those of the mainland. The let-alone policy that has been practiced here from time immemorial has seen its day, and the more intelligent classes now are beginning to realize that to enjoy the flower garden and the fruits of the few trees in their yards they must practice closer supervision and adopt more of Burbank's methods,

which many are now doing. The cleaning up of the banana fields, narrated on page 138, shows what clean culture methods have done for this particular industry. The same methods would be equally efficacious with other crops.

The steady increase of fruit and plant shipments arriving in Honolulu from the Orient and the Coast, added to the fact that the completion of the Panama Canal will bring the Territory into direct communication with Central and South America, as well as Mexico, makes it quite apparent that ample funds are necessary for the extension of the work of the Division of Entomology.

#### ANIMAL INDUSTRY.

The report of the Division of Animal Industry occupies ninety-odd pages of the report and treats in an interesting way the important subjects of the live stock industry of the Territory, bovine tuberculosis, glanders and the quarantining of dogs on account of the danger of rabies, as well as outlining the routine work of the division staff. The report is made jointly by Dr. Victor A. Norgaard, Territorial Veterinarian, and Dr. Leonard N. Case, Assistant Territorial Veterinarian.

Under the heading "Live Stock," facts and figures are presented showing the large number and fine quality of animals that are now being brought into the Territory each year for breeding purposes. For one example of the good accomplished, the average weight per carcass and the average price of meat per hundredweight received by the producer, has increased in the past three years, from 449 to 490 pounds, and from \$9.77 to \$9.96, a result in part of the introduction of better blood.

Another important fact in this connection is that the former practice of "stuffing" shipments to Hawaii with one or more worthless animals has practically disappeared. With the present strict inspection and quarantine it does not pay to use Hawaii as a dumping ground.

A number of illustrations show cattle, mules and horses imported by various ranches or individuals, particularly by the Parker ranch on Hawaii. These pictures alone make the report of interest, showing as they do how high a grade of stock is now being introduced.

Under the head of "Diseases of Live Stock," it is stated that "the past year has been practically devoid of any serious outbreaks of either infectious or contagious diseases among live stock, while parasitic diseases have continued to decrease with improved methods in handling and caring for the animals."

#### ONE STARTLING REASON.

The section on the control and eradication of bovine tuberculosis is one that ought to be read by the head of every household, for, as Dr. Norgaard says, when "more than twenty-five

per cent. of all cases of generalized tuberculosis among children under sixteen years are due to the bovine type of tubercle bacilli, it appears indefensible to allow a single tuberculous animal to remain in the Islands."

The record of the tuberculin testing of the dairy herds on Oahu, which resulted, through the destruction of affected animals, in reducing the percentage of disease from 31.26 per cent. at the first test to 5.39 per cent. at the third, is one of which the Territory may well be proud. It points the way to what ought now to be done in the other counties of the Territory, and also to the fact that having gone so far there must be no decrease in continued vigilance through efficient inspection; that alone is the price of liberty in animal industry as in the other affairs. To accomplish this, Dr. Norgaard repeats the recommendations of the milk commission of 1910, and the sanitary commission of 1911, that the control of milk be vested in the Territorial Board of Agriculture and Forestry, in order to secure protection for the entire Territory.

The chapter on the eradication of glanders is one full of interest, especially the almost dramatic account of the suppression of an outbreak of this disease in Waipio Valley, Hamakua, Hawaii, and the treatment of a suspicious case at Schofield Barracks. The reimbursement is advised of owners whose diseased animals have to be killed to insure the safety of the public.

Perhaps of greater scientific than popular interest is the description of the intradermal tests, with mallein and tuberculin, that having been perfected by the Division of Animal Industry, were successfully applied, respectively in investigations of glanders and tuberculosis. But these statements, with those concerning sheep and chicken diseases, give the report weight and character.

#### PROTECTION FROM RABIES.

The occurrence of rabies in California was the occasion, in 1911, for the passage of a regulation by the Board regarding the quarantine of dogs coming into the Territory. This subject is discussed at length, with a description of the dog quarantine station. There is also an account of a newly devised painless method of putting out of the way, by the use of gas, mangy dogs that it is found necessary to dispose of. Pictures illustrate the operation of the "lethal chamber," before and after.

Following that by Dr. Norgaard are reports from the deputy Territorial veterinarians, Dr. H. B. Elliot, Hilo; Dr. J. C. Fitzgerald, Maui, and Dr. A. R. Glaisyer, Kauai. Each takes up the subjects of diseases of live stock and the introduction and breeding of high-class animals. Attention will especially be attracted to this part of the report by the illustrations of thoroughbred horses recently imported into the Territory.

Altogether the report is the most interesting that has come from the Board of Agriculture and Forestry, showing as it clearly does the many directions in which this department of the Territorial government is being of practical service to the people of the Territory. A note on the cover, giving a list of the board's publications, says that this report, as well as the other printed matter put out by the board, will be sent free to any resident of the Territory upon request.

## DIVISION OF FORESTRY.

The Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I have the honor to submit as follows the routine report of the Division of Forestry for January, 1913.

### BIENNIAL REPORT.

During practically the whole of the month my own time has been taken up with the preparation of the biennial report of the Division of Forestry for the years 1911 and 1912, and in getting ready for presentation to the Legislature certain other data required by the Board in connection with forest work. This report of the division, now in the hands of the printer, sets forth in detail what has been accomplished during the past period, with a general statement of the reasons why the necessity for practical forestry must always remain one of the essential needs of this community. When printed the report will be available for general distribution.

### PLANT DISTRIBUTION.

The report of the forest nurseryman shows that during this winter a large number of tree seedlings are being sent out to sugar plantation companies for forest planting. One corporation on Oahu alone has ordered half a million seedlings for delivery this winter. A part of this lot goes forward early in February.

In this connection it may be permissible to repeat from my biennial report the totals from a table showing the number of trees reported planted by corporations throughout the Territory during the past two years. For 1911 the figure is 1,134,940; for 1912, a little larger total, 1,303,698. Had it not been for the dry season the figure for 1912 would undoubtedly have been considerably larger than this. In 1908 a similar estimate totaled 498,677. These figures show conclusively that the arguments as to the value of tree planting have made an impression. As the years go by those who have planted stands of trees will have more and more reason to be glad that they did so.

## CONGRESSIONAL VEGETABLE SEED.

Early in January there was received from Washington the usual consignment of Congressional vegetable and flower seed from the Delegate to Congress, Hon. J. K. Kalanianaʻole. Following the custom of former years, this seed is being given general free distribution through the schools, particularly those that are making a specialty of school garden work. But anyone who applies may obtain a packet of seeds, free, for his own use. The kinds available are lettuce, muskmelon, onion, radish, tomato, corn and cucumber.

The flower seeds are candytuft, calendula, kochia, mignonette, poppy, zinnia, nasturtium and dianthus.

The Delegate writes: "Perhaps you might advertise the fact that you have seed on hand for distribution, as I believe you have done in the past. The flower seeds, especially, I would like to reach those people who are interested in having their front yards looking nice." Application for seed should be addressed "Seed Clerk, Box 207, Honolulu, Hawaii."

Very respectfully,

RALPH S. HOSMER,  
Superintendent of Forestry.

## FOREST NURSERYMAN'S REPORT.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir:—The following is the report of the principal work done by the Forest Nurseryman for the month of January, 1913:

*Nursery.**Distribution of Plants.*

	In seed boxes.	In boxes transplanted.	Pot Grown.	Total.
Sold . . . . .	.....	....	122	122
Gratis . . . . .	2000	1050	883	3933
	2000	1050	1005	4055

*Collections.*

Collections on account of plants sold amounted to.....	\$ 4.40
Collections on sale of dead wood from Tantalus.....	25.00
Collections from Dr. E. A. Back for rent of building, Nursery grounds, from Oct. 16 to Dec. 31, 1912, at \$35 per month .....	87.90
Total .....	\$116.90

*Plantation Companies and Other Corporations.*

An order for 5000 trees ready to be set out, to be delivered about the middle of March, has been received.

Distributed during the month:

In seed boxes .....	82,000
In boxes transplanted .....	1,000

Total .....	83,000
-------------	--------

About 100,000 trees will be delivered during the month of February and the balance of this season's orders will be completed by the end of March.

*Experimental Garden, Makiki.*

Owing to the great demand for trees during the past few months, including the Arbor Day distribution, our stock has been very much reduced and we are busy both at Makiki and the main nursery trying to get a sufficient quantity ready to meet demands likely to come in.

*U. S. Experimental Station, Nuuanu Valley.*

The man has been doing the regular routine work. The weather has been dry during the month and no planting of trees could be attempted.

Respectfully submitted,

DAVID HAUGHS,  
Forest Nurseryman.

## DIVISION OF ENTOMOLOGY.

Honolulu, January 31, 1913.

Honorable Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of January, 1913, as follows:

During the month there arrived 43 vessels, of which 27 carried vegetable matter.

## DISPOSAL.

	Lots.	Parcels.
Passed as free from pests.....	863	23,959
Fumigated . . . . .	13	219
Burned . . . . .	67	104
Total inspected .....	943	24,282

Of these shipments, 24,045 packages came as freight, 172 packages as baggage and 65 packages in the mail.

#### RICE SHIPMENTS.

During the month 29,254 bags of rice arrived from Japan which were found free from weevil and other pests and were passed.

#### PESTS INTERCEPTED.

Sixty-five packages of fruit and 20 packages of vegetables were found in the baggage of the passengers and immigrants from the Orient, and this material was destroyed by burning.

Several small lots of orchids came from Manila which were infested with scale insects and ants. Six boxes of apples from California were destroyed on account of being infested with the codlin moth. A small shipment of gardenia florida from Japan was found badly infested with larvae of a wood-boring moth. This is the second shipment found thus infested and all the plants were destroyed in the garbage incinerator. In a plant shipment from Japan we found in the soil a number of larvae and pupae of a cicada or harvest fly. This is the first time cicadas have been found in plant shipments. The cicadas are very injurious insects in many countries. They include the well-known 17-year locust of the Eastern United States, about which so much has been written and which causes so much damage to farm and forest growth.

Two species of ants were found in soil around plants—*Lasius niger* from Japan, and *Monomorium pharaonis*, the common house ant, in soil from Manila.

Late in the afternoon of the 28th inst. the Makura arrived from Sydney via Suva, and just before sailing, late at night, one of the crew threw a crate of rotten bananas on the dock which belonged to a passenger going to Victoria, B. C. The crate and contents were taken to the incinerator early the next morning and burned. It is very fortunate that this fruit was not infested with maggots of the banana fruit fly, which would no doubt have crawled into the crevices of the dock.

#### HILO INSPECTION.

Brother Matthias Newell reports the arrival at Hilo of six vessels, five of which brought vegetable matter consisting of 157 lots and 3249 packages. Six crates of celery had to be cleaned from adhering soil. One sailing vessel brought 500 tons of clean and dredged sand from San Diego bay, California, and consigned to the Hilo Railroad.

## INTER-ISLAND INSPECTION.

During the month of December 62 steamers were attended to and the following shipments were passed:

Plants . . . . .	66 packages
Taro . . . . .	784 bags
Lily root . . . . .	39 packages
Vegetables . . . . .	9 " "
Fruit . . . . .	1 package

Total passed after inspection.....899 packages

The following packages were refused shipment:

Plants . . . . .	12 packages rejected on account of soil
Lily root . . . . .	6 " " " " " "
Fruit . . . . .	15 " prohibited

Total..... 33 packages refused shipment

Respectfully submitted,

E. M. EHRHORN,  
Superintendent of Entomology.

## DIVISION OF ANIMAL INDUSTRY.

Honolulu, January 31, 1913.

Hon. W. M. Giffard, President and Executive Officer, and Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I have the honor to submit the following report for the month of January, 1913:

## TUBERCULOSIS CONTROL.

The work in this direction, which was temporarily suspended that sufficient time might be given to the writing of the annual report, has now been resumed, and the fourth annual test of the dairy herds of the city and county has commenced. The dairies so far submitted to the test are as follows:

	T.	P.	C.
Waialae:			
Milking herd . . . . .	190	169	21
Common herd . . . . .	225	184	41
Mrs. Isenberg's herd . . . . .	55	54	1
Carl Waldemeyer . . . . .	4	4	0
Charles Lucas . . . . .	2	2	0
(New cows added to the herd.)			



There still remains above ten per cent., actual figures 13.19%, of tuberculosis in the Waialae herd. In the past three years the proportion has been reduced from seventy-five per cent. to the present figures, 13.19%. That it has not been reduced to a still lower percentage is due entirely to the fact that we have been unable to apply the test each time to the *entire* herd. In that portion of the herd which remained untested each time there were a few, one or more animals, which were infected and which passed the previous test due to the fact that the disease was still in its incubation. These animals, now that the disease has become advanced, become a grave source of danger, and are the ones which infect the others, spread the disease and keep up the percentage of diseased animals. To cut this percentage down and to eliminate the possibility of any animal remaining to spread the disease, frequent tests of the entire herd should be made. On April next every animal connected with the Waialae herd should be submitted to the test.

#### INTRADERMAL MALLEIN TEST.

On the 13th, at the request of Dr. Vans Agnew, Dr. Norgaard and myself proceeded to the military post at Schofield Barracks for the purpose of applying the intradermal mallein test to twenty-six officers' mounts which were to be shipped to the mainland. The object was in the main a demonstration to the post veterinarians of the technique of this new method of mallein testing. The demonstration was a decided success and all of the animals subjected were passed. Dr. Vans Agnew, while fully realizing the great care necessary in making the injections, was very favorably impressed by the simplicity and accuracy of this method, which reduces time and labor to a minimum.

#### FORAGE POISONING AT PUPUKEA.

In the early part of the month Mr. F. S. Lyman called at this office and reported the loss of a considerable number of his cattle, both young and matured animals, from some undetermined cause. He stated that there had been a continual drought for some time, and green feed was very scarce. He had recently cleared a large tract of land from lantana and had turned his stock in there, when they suddenly commenced dying in alarming numbers. Death occurred suddenly with few premonitory symptoms. The symptoms which he was able to observe were loss of appetite, decreased flow of milk, lack of coördination of certain muscles, staggering gait and a more or less sanguinous discharge from nose and anus, following which the animal died in a few hours.

Acting upon this report Dr. Norgaard and myself proceeded at once to Mr. Lyman's place at Pamalu, with all the necessary paraphernalia for microscopical examination. Post mortem ex-

amination was held on one animal which had died the night before, the results of which are as follows:

The animal, a cow, was found to be in good flesh. Upon removing the skin no hemorrhagic, subcutaneous extravasations were found; liver slightly enlarged with evidences of some fatty degeneration, and numerous scars from fluke although no parasites were found; kidneys showing some congestion in both cortex and medulla; considerable enteritis and some enlargement of Peyer's patches, the contents of the intestines being considerably blood-stained; spleen considerably enlarged, being four to five times the normal size, dark red in color with a very soft, almost fluid, pulp almost black in color; heart and lungs normal; blood normal. The first, second and third stomachs were found filled with a large amount of a certain weed which was found growing abundantly in the pasture and also a considerable amount of leaves from the kukui tree. Numerous inflammatory submucous patches were observed in all three stomachs and must be attributed to the action of the weed. The fourth or true stomach contained a certain amount of fluid material and appeared to be in every way in a normal condition.

Microscopical examinations from the spleen, intestinal contents and blood revealed putrefactive organisms only. The suspicions of anthrax were thereby allayed.

Working upon the theory that the trouble was due to some poisonous weed, a thorough investigation of the pasture was made and samples taken of the weed which was growing abundantly over the field and with which the paunch of the animal was filled. This weed was the only green thing growing in the pasture with the one exception of the leaves of the kukui tree. The samples collected were submitted to Mr. J. F. Rock, botanist at the College of Hawaii, for classification. Mr. Rock classified the plant as the *Asclepias curassavica* L., the nuumela of the natives belonging to the family Asclepiadacea. This species is known to be very poisonous, and has been the cause of considerable cattle poisoning in Australia.

This weed grows abundantly in many of the valleys, springing up quickly after a little rain, but as a rule cattle do not eat it unless forced to do so through the absence of other feed. That they were forced to eat large quantities of it in this instance was apparent from the condition of the pasture, which was entirely bare of grass and afforded nothing else of an edible nature. Therefore our conclusions in the matter were that the cattle were dying from the poisonous effects of these weeds. In an attempt to verify our conclusions we had a couple of bags of this weed forwarded to us with the intention of carrying on a few feeding experiments and noting the results, but so far we have been unsuccessful in our attempts to force the animal at the station to eat any of it. Since our last visit Mr. Lyman has not reported any more deaths.

## IMPORTATIONS.

The following number of vessels entering this port were boarded and the following live stock was inspected, passed and admitted to the Territory.

Twenty-two vessels were boarded, of which number eight were found carrying live stock, as follows:

January 14, U. S. A. T. Sheridan, San Francisco:

1 dog, Lieut. Thatcher.

1 racoon, 25th Infantry.

January 14, S. S. Lurline, San Francisco:

3 horses, Q. M. Department.

1 horse, J. D. McVeigh.

1 cat, W. F. X. Co.

1 dog, C. Breand.

1 dog, E. L. Kelley.

3 dogs, Col. Kennon.

2 dogs, Capt. Norris.

8 crates poultry.

January 15, S. S. Siberia, San Francisco:

1 dog, H. B. Post.

January 20, S. S. Ventura, San Francisco:

1 crate ducks, W. F. X. Co.

January 21, S. S. Wilhelmina, San Francisco:

1 dog, Mrs. E. Behr.

18 crates poultry.

January 26, S. S. Arizonan, Seattle:

2 horses, Q. M. Department.

18 mules, Schumann.

January 28, S. S. Mongolia, Orient:

2 crates ducks, Japanese.

January 28, S. S. Honolulan, San Francisco:

2 dogs, V. R. Isenberg.

26 crates poultry.

4 shorthorn bulls, Hawn. Commercial & Sugar Co.

Very respectfully,

L. N. CASE,  
Assistant Territorial Veterinarian.

## HOW TO START RIGHT IN THE HOG BUSINESS.

(From *The Live Stock and Dairy Journal*.)

The essential principles for starting with hogs in Colorado and in California are so identical that the following advice given by C. W. Henry, a successful breeder, to the readers of the *Colorado Dairyman* will interest many of our readers:

There is no line of the live stock business one can get into with so small an outlay of capital as hogs, and the first cost of pure-breds is so small, considering the advantages gained, between those and just common stock that no one should hesitate in deciding which to take.

In the matter of equipment all one needs in Colorado is plenty of good alfalfa pasture. Several smaller pastures are better than one large one, as the hogs can be changed from one to another while the one is being irrigated, thus insuring abundance of fresh, tender alfalfa at all times. For shelter I have never found anything to compare with the A-shaped "Lovejoy" individual houses. One great advantage of these is that they can be built as one's business grows, and you don't have to have a lot of money at the start. They will cost around \$10 each, and any one used to using tools on a farm can build them. They are made of drop siding, 2x4s and inch boards for the floor. They are sanitary, and even in the coldest weather are amply warm. I know of a man who built a very expensive concrete hog house, concrete troughs, walls, floors and everything in the most expensive manner, and I don't believe this hog house will ever be as satisfactory as the "Lovejoy" individual, and the cost was ten times as great. These houses can be put on skids and moved anywhere, are always dry and no better farrowing pen could be desired. If a man is starting with only one or two sows he can build a couple of houses, and as his herd increases build more as they are wanted.

The pastures and houses are about all one needs in the way of equipment to start. There could be added such things as a cooler or steamer so that warm feed can be supplied in zero weather. I believe it will always pay to give hogs warm feed in the winter. At least I never could stand to see my pigs fill up on ice-cold feed and then run shivering to shelter.

After the equipment, of course, come hogs, and here is where so many fail. If one is unfortunate and gets inferior stock he is apt to get discouraged at the outset. I believe without doubt that the quickest way to get started is to buy a bred gilt or sow or two and if their litters are raised one has quite a herd at the end of a year.

If I were starting again I would buy the very best bred sow or gilt bred to the best boar in the State, and in that way with

reasonable success with the pigs be at the top at the outset. Whereas, if only fair sows or gilts are bought it will take years of improvement to be where one would be at the end of the first year. I feel that even in Colorado one can sell the best, and usually at a pretty fair figure, but there are always plenty of the inferior kind going begging. If, however, the pigs do not sell readily for breeders one can always sell to the butcher, and at the top of the market, too. For the beginner I think it a good plan to save only a few of the very best for sale as breeders until one has established a reputation, and later on there will always be a market for surplus stock. I know I have sent hundreds of better pigs to the packers than many breeders sold in the East for high prices, as breeding stock. In fact, if any Eastern breeder has ever sent out here an outstanding individual, regardless of price, unless the buyer has been there and picked it out, I would like to hear of it. I never have seen one.

## ESPARTO GRASS FOR PAPER MAKING.

(From *Daily Consular and Trade Reports*.)

[Consular Assistant Ripley Wilson, Almeria, Spain.]

Esparto grass ranks third among the exports from Almeria, and this city is the center of the industry in Spain. There are three firms engaged in preparing the grass for shipment, and these buy direct from the villagers who do the gathering and who bring the esparto in from the surrounding country.

At present esparto can be purchased as it comes in from the country for about 67 cents per 46 kilos (101½ pounds); but this grass can not be baled and shipped for paper-making purposes without first being carefully inspected and cleaned of roots and bits of earth and other foreign matter that the natives include in the rough bundles they make. This cleaning in the factories of Almeria is done entirely by women, who are paid according to the amount they look over. One rarely earns more than 35 cents a day. While cleaning the grass these women also sort the esparto into two grades, the first consisting of the full, heavy grass, and the second of the lighter and discolored stock. The first grade seldom yields under 55 per cent. pulp.

The facilities that are offered by the local railway make it very difficult at times to bring the grass in from the outlying districts, and the trouble encountered during certain seasons of the year in getting ships for transport make the business an uncertain one. The fact, as stated in other consular reports, that the esparto root is often picked with the grass is true in this district also, and much damage is being done each year.

At various times the construction of a pulp factory in Almeria

has been considered, but largely on account of the great difficulty in obtaining water, a plentiful supply of which is needed in pulp making, the factory has not materialized. The bulk of esparto exported from this city is sent to Great Britain.

[Consul Rufus Fleming, Edinburgh, Scotland.]

SCOTCH PAPER MAKERS USE ESPARTO EXTENSIVELY.

Paper mills in this district, producing about 1500 tons per week, 1000 tons being writing and printing paper, use large quantities of esparto, both Spanish and African. Almost three times as much esparto (in weight) is imported into the district as of rags and wood pulp combined. It is imported in hydraulically compressed bales, of uniform weight and size, approximately seven bales to the ton (2240 pounds). From Spanish esparto the yield of paper is 55 per cent.; from African, about 50 per cent.; and from rags, 90 per cent. News print is largely made from mechanical wood pulp, with the addition of a small proportion of common rags.

Most of the mills in east Scotland have contracted for their supplies of first-quality Algerian esparto over 1913 on the basis of £3 9s. (\$16.79) per ton, free on rail at Edinburgh. Prices advanced somewhat last fall, and sales were made to English ports for shipment in 1913 at £3 12s. 6d. (\$17.64) free on rail. Tunisian esparto is scarce. As a rule, shippers of this variety sell Tripoli or (and) Tunisian esparto, and the cessation of supplies from Tripoli caused a run on Tunisian, and has indeed affected the price of all African esparto. Tunisian and Tripoli usually sell about 5s. (\$1.21) to 3s. 6d. (85 cents) per ton below Algerian, but there has lately been practically no difference. For best Spanish esparto the average contract price for 1913 has been about £4 15s. (\$23.11) free on rail at Edinburgh. This article appears to be short, and if further quantities were required it is probable that a considerably higher price would have to be paid.

Wholesale prices of esparto papers in this market range from 4½ cents to 6½ cents per pound, according to quality.

## VALUABLE FOREST TREES OF CHILOE ISLAND.

(From *Daily Consular and Trade Reports.*)

[Consul Alfred A. Winslow, Valparaiso, Chile.]

According to lately published reports on the forest lands of Chiloe Island, situated off the coast of Chile, between 41° and 43° south latitude, many kinds of valuable trees and shrubs are found awaiting capital and labor to open up important industries in that part of the country. This island contains 2450 square miles and is covered with dense forests, except for a narrow strip along the west coast. The names, with a short description, of the more useful trees and shrubs are as follows:

Cypress (*Libocedrus tetragona*).—It is not known whether there are great quantities on the main island or not, but the tree abounds in the neighboring archipelago. It is a white timber, with a slight pinkish tint, resinous, and elastic. Its duration is such in all weather and atmospheric conditions that it is said to be almost indestructible. This and the alerce command the highest prices.

Alerce (*Fitzroya patagonica*).—About the same as the cypress, of great duration, fibrous, red, and light. It is said that these trees are found in almost all parts of the island. The wood is used for ceilings of houses and lasts for 50 years and more.

Manui (*Saxcegothea conspicua*).—A very abundant timber on the island of Chiloe; is very good for cabinetwork on account of soft and beautiful fiber. If exposed to the weather it lasts but a short time, and so is mostly used for flooring.

Ciruelillo (*Embothrium coccineum*).—This timber excels all others on the island for cabinetwork and can compete with the best imported into the country. Its tint is slightly pink, beautifully striped, and when properly polished has a metallic luster. The tree grows rapidly and is appropriate for park and garden ornamentation.

## LAUREL GROWS IN ALL PARTS OF MOUNTAINS.

Laurel (*Laurelia serrata*).—There is not a point in the mountains of the island where this tree does not grow. It is the one most used and commands the lowest price. It is used for inside work, where it will not be subject to the changes of the weather.

Luma (*Myrtus luma*).—A very large tree abounding in the forests of Chiloe. Its lumber is red, very hard, and durable. It is used for the manufacture of carriage wheels and barrels.

Meli (*Myrtus meli*).—About the same as the luma, the only difference being in the color. It has the same properties and uses.

Muermo (*Eucryphia cordifolia*).—A very abundant tree on the island and grows to be very large. It is used in the foundation of buildings and for carriage making. It also produces good charcoal.

Tenio (*Weinmannia trichosperma*).—Large, abundant tree, with red timber. Uses same as muermo.

Avellano (*Geruina avellana*).—Similar to the ciruelillo in its fiber, although it has not the same pinkish tint. Its lumber is beautiful, but cracks and twists if exposed to the weather.

Tiaca (*Weinmannia paniculata*).—Flexible lumber very much used in the construction of boats, etc.

Radal (*Lomatia obliqua*).—Used in the manufacture of furniture; is of inferior quality to the ciruelillo.

Roble (Coigue) (*Nothofagus dombeyi*).—A very large tree of white lumber, soft and abundant in the island. Of short duration if exposed to the elements.

Tique (*Aextoxicon punctatum*).—Abounds only in the interior of the forest and is but little used as yet.

#### LUMBER IMMUNE FROM RATS AND VERMIN.

Canelo (*Drimys chilensis*).—This is a tree of beautiful foliage, which grows to great size and is very abundant in the island. Its timber is used for the interior of buildings. The lumber has the peculiarity of never being attacked by rats or vermin.

Arrayan (*Eugenia apiculata*).—This tree is characterized by having very red bark and being subject to changes every year. Hard lumber used in carriage construction.

Pelu (*Edwardsia macnabiana*).—A beautiful tree with a yellow flower and with very hard timber. It is not very abundant, except perhaps in the interior of the island.

El Tepu (*Tepualia*).—A shrub which spreads horizontally on damp places, forming an impregnable barrier for man and beast. It is used as fuel and is noted for the heat it produces. It is burned in the sawmills of the island.

Quilineja (*Lazuriaga*).—Exported to Europe for the manufacture of baskets and brooms. This plant is a parasite and its roots adhere to the trunks of trees.

Quila (*Chusquea quila*).—A sort of bamboo and very abundant on the island. It is good food for cattle and supplies most of the forage for the stock raised on the island. It has been found to be rich in pulp suitable for the manufacture of paper.



## THE EFFECT OF SOIL AERATION ON PLANT GROWTH.

C. Hunter, B.Sc., who has contributed an interesting paper to the *Proceedings of the University of Durham Philosophical Society* states that as a result of the various experiments which have been carried out with the object of investigating the connection between soil aeration and plant growth, it has been found that—

The circulation of the air in the soil affects the development of the root system and through that the development of the sub-aerial portions of a plant.

The production of artificial air currents in the soil appears to be beneficial to plant growth. This point is at present undergoing further investigation.

These experiments were undertaken at the suggestion of Professor Potter.

## DESTRUCTION OF LANTANA.

This plant is apt to become a great nuisance in tropical countries on cultivated and pasture land, owing to its dense growth and extraordinary vitality. It appears from the *Journal d'Agriculture Tropicale* (1912, 12, 154) that an attempt is now being made in New Caledonia to combat the pest by introducing a species of fly of the Agromyzidae family from Hawaii. The insects have been distributed in the environs of Numea on land infested with lantana. As a result the larvae of the fly have been found in many of the seeds and it is intended to extend its distribution in the colony. The result of the experiment will be watched with interest; it must be borne in mind, however, that where a new animal species has been introduced to destroy some pest it has itself sometimes proved to be injurious in other directions.—*Imperial Institute Bulletin*.

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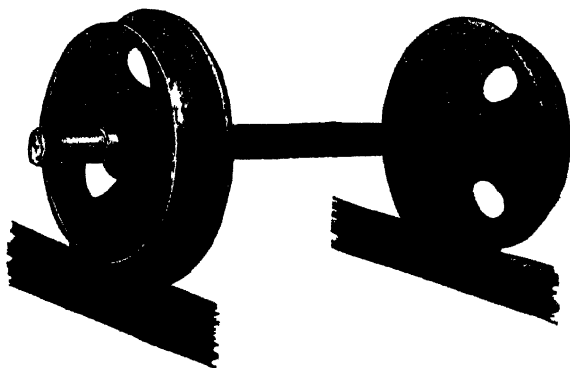
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No. 3.

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Additional information will be found in the report of the Division of Animal Industry for February regarding the distemper at Pupukea, Oahu, to that furnished in the report for January. It would appear to be settled that the disease was produced by poisonous growths in the pasture. An interesting article appears elsewhere from an exchange on the influence of soil and climate on the edibility of certain plants, which would appear to have some bearing on the Pupukea incident.

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Two chicken diseases that have appeared in the islands are described in the report of the assistant veterinarian for February.

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An article on the Ceylon gooseberry in this number may have some interest for our homesteaders and suburban dwellers.

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In his report for February the Territorial entomologist tells of some bad pests intercepted that month.

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The Mindanao Herald, an exchange from which the Forester has frequently culled interesting matter, had its office destroyed in the conflagration that wiped out a large business section of Zamboanga, Mindanao, P. I., on Sunday night, February 2. It saved only a "baby" press, on which its issue of February 8 was printed. Fraternal sympathy is hereby extended to the paper.

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The Hawaii Educational Review, "a monthly periodical devoted to the dissemination of educational thought and progress, particularly as adapted to the Territory of Hawaii," is welcomed among our exchanges.

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President W. M. Giffard of the Board of Agriculture and Forestry, has received gratifying reports from Professor Silvestri, the eminent entomologist engaged by the board last year to seek a parasite for the Mediterranean fruit fly in Africa. The professor has succeeded so far that, at last accounts, he

was on his way from Capetown to Australia with colonies of such parasites, having discovered five varieties. In Australia he will endeavor to propagate fresh colonies to transport to Hawaii. Such ultimate success is eagerly hoped for here.

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Is there room for the small farmer in Hawaii? For the twelve months ended December 31, 1912, Hawaii imported from the mainland animals to the value of \$343,994; breadstuffs, including animal feed, \$2,396,062; fruits and nuts, \$380,376; meat and dairy products, \$1,134,432; tobacco, manufactures of, \$772,027, and vegetables, \$369,755. These articles make a total of \$5,376,446, all of which might be supplied by Hawaiian farmers.

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For the twelve months ended December 31, 1912, Hawaii shipped to the United States fruits and nuts to the value of \$3,528,236, of which \$3,329,097 was represented by canned pineapples. As an item of our exports that scarcely showed at all a few years ago, this exhibit is very encouraging. There are other things than pineapples which, backed by capital, intelligence and pluck, would equally reward enterprise.

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In 1912 coffee to the amount of 1,785,920 pounds and valued at \$289,043 was shipped from Hawaii to the United States. The quantity in 1911 was 2,903,887 pounds and the value \$419,464. There will be a large crop this year. Figures of considerable exports of Hawaiian coffee to foreign countries are not at the moment available.

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Exports of honey from Hawaii to the mainland in 1912 were of the value of \$51,256, against \$36,224 in 1911.

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Shipments of raw wool from Hawaii to the States in 1912 amounted to \$51,422, against \$63,019 in 1911.

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Exports of domestic products from Hawaii to foreign countries last year amounted to \$532,666, as compared with \$827,067 the year before.

*EFFECTS OF GRASS ON FRUIT TREES.*

An abstract of an account of classical research on the subject of the effects of grass on fruit trees is printed in the *Agricultural News* for March 15. The authorities quoted are the Duke of Bedford K. G., F. R. S., and Spencer O. Pickering, M. A., F. R. S. The article says in part:

"The action of grass on fruit trees is often so deleterious that it arrests all growth, and even causes the death of the tree. The action is not noticed so much when the trees become grassed over gradually during the course of several years, for under these surroundings they can apparently adapt themselves to the altering conditions and suffer much less than when the grass is actually sown over their roots.

"It was thought some years ago that the action of the grass might be explained by its affecting the aeration of the soil by altering the amount of carbon-dioxide present, or by its effect on soil temperature, the moisture content or mechanical conditions. Any explanation on such grounds was found to be inadequate.

"It would not be possible in the space of this article even to refer to the various ingenious experiments that were conducted in order to obtain this negative generalization. It will be sufficient to proceed at once to the biological investigation of the question which commenced with an examination of the effect on fruit trees by heating soils—partial sterilization. Briefly, it was discovered that a toxic substance is produced by heating soils, which was found to be toxic toward the germination of seeds as well as toward the growth of plants, retarding the germination and reducing the percentage of seeds which germinate. After cultivation, however, the toxic substances become oxidized and the soil supports growth better than when not heated.

"Curiously enough, soil removed from grassed ground was slightly more favorable toward germination than the tilled soil, and it absorbed water much less readily than the neighboring tilled soil. This behavior provided negative evidence in favor of the production of toxic substances in grassed soils; and strong evidence of a positive character was obtained later, by causing washings, from grass growing in soils on trays, to reach the tree-roots with practically no exposure to the air.

"A deleterious effect was then produced nearly if not quite as great as when the grass was grown above the roots in the ordinary way."

*MIGHT BE GOOD FOR HAWAII.*

The Agricultural News advocates a herd book for the West Indies, and some of its arguments would appear to apply to Hawaii. A few passages from the article are here quoted:

"It is perhaps in connection with milk and meat production that benefit would be derived most quickly. It has already been pointed out that the characteristic feature of the animal industry in temperate countries is the clear line of demarcation between beef and dairy breeds. In the West Indies, apart from imported milch cows, there is no such clear distinction. Native milch cows are often used for working in the fields, and calves reared for killing or for labor may frequently have a common origin. It is true that the importance of a well bred bull is fully acknowledged in a general way, but sufficient recognition is not given to the importance of a bull of good milking strain in the breeding of dairy cows, and conversely to the importance of a cow possessing good 'beef' points in the raising of those animals which supply the community with meat. Moreover, there is the purely business aspect of the matter to be considered. It has been pointed out in connection with working cattle the form of an asset, but in the case of meat and milk production an increase in profits will show itself as surely in the West Indies as it has done in other parts of the world.

"One of the chief reasons for organization in these matters is the fact that the grazing of animals and milk supply is to a large extent in the hands of the peasants. If some system of registration were established the progeny of the best animals would in the long run take the place of those of the worst, and an additional advantage would arise in that a system of registration would tend to improve matters in regard to the prevalence of hereditary diseases.

"It may be put forward as an objection to any such organized scheme for selection that the climatic conditions and animal feeding in the tropics are unsuitable, that it would mean the continual importation of fresh stock and necessitate an alteration in the management of estates. But that would not be so. The object would be to select within the existing herds—not to select by means of the fortuitous crossing of worthless cows with imported bulls in a vain endeavor to raise West Indian cattle to the same standard that exists in countries which are eminently adapted for stock breeding. It is true that some improvement in feeding and management might be desirable and in this matter the agricultural societies would serve a useful purpose in the dissemination of information and in the provision of veterinary assistance. Further help could be rendered by the agricultural societies through an introduction of the score-card system of judging into the agricultural shows."

## NEW METHOD OF PRESERVING MEAT.

A Belgian engineer has invented a machine which in all probability will diminish the importance of the present systems of cold storage in the preservation of large quantities of meat. The new method is described in the Bulletin of the Bureau of Agricultural Intelligence and of Plant Diseases for December, 1912.

In this it is stated that the invention is based on the fact that when the water that enters into the composition of meat is caused to evaporate, the organic liquids are concentrated to a point at which bacteria do not develop except with great difficulty. Moreover, during the process of evaporation the meat becomes coated with a film of gelatinous matter which protects the meat from further infection.

The loss of moisture is caused to take place by means of a vacuum apparatus in which, towards the end of the operation, both low pressure and temperature act together to desiccate only the surface of the meat. After a certain quantity of water has evaporated, ozone (a form of oxygen) is admitted as a sterilizing agent.

Treatment for twenty hours causes the meat to lose about 20 per cent. of its original weight. The quantity of ammonia present (which is indicative of putrefaction) is less in the vacuum-treated meat than in ordinary fresh meat. The new process is said not to affect the composition and appearance of the meat within the protective film on the outside, and the taste is believed to be superior to that of frozen meat.

The chief advantage of the process is that the cost price of meat preserved by the vacuum method is less than that by cold-storage, because it can be treated at the centres of production.

If it is found that desiccated meat can be shipped as ordinary cargo there would appear to be some possibility of a trade becoming established in this article between South America and the West Indies, or what would be preferable, a deflection to the West Indies of some of the best Canadian beef that at present goes in large quantities to Smithfield.—*The Agricultural News*.

## MAXIMUM PROFIT FROM PEN MANURE.

The indifferent and careless management of pen manure means the loss of large quantities of available plant food. Liquid excrement is more valuable than solid, pound for pound. Water-tight floors and plenty of absorbents are necessary to prevent its waste. All pen manure is more valuable fresh than after storage. Leaching by rains is one great source of loss. Manure heaps loosely made and located under the eaves or on hillsides lose half of their value. Large losses of nitrogen occur by



fermentation, noticeable by the smell of ammonia. This is due to organisms which require air. Packing the manure pile with a dip to the center and keeping it soaked with water, keeps out the air and reduces fermentation. Fresh manure may be spread at once on moderately level fields. There is little loss by fermentation, and the plant food leaches into the ground. (From Bulletin No. 221, of the University of Wisconsin.)

## CEYLON GOOSEBERRY

(From the Tropical Agriculturist.)

The tree to which the writer gave the name "Ceylon Gooseberry" some years ago, first in a Departmental Circular on tropical fruits, deserves the attention of fruit growers in the tropics, for few fruits in a wild state appear to offer more promise of improvement by systematic selection and high cultivation. It is a small shrubby tree with ovate, alternate leaves belonging to the family *Biraceae* and known to botanists as *Aberia Gardneri*, being named after Mr. Gardner, who was superintendent of Peradeniya from 1844 to 1849. To the natives the tree is known as "Ket-embilla" and an interesting fact in connection with it is that it is endemic in Ceylon. that is having its native habitat confined to this country. The round and slightly velvety berries are somewhat of the size, form and consistency of gooseberries, being purplish in color when ripe. They have a pleasant sub-acid taste and make excellent jam or preserves. The tree thrives best at medium elevations and likes rich humous soil and good drainage. It is readily propagated from seed which, being small, should be sown in pots under cover, using fine sandy soil. The fruit is in season usually in September.

H. A. MACMILLAN.

## DIVISION OF ANIMAL INDUSTRY.

Honolulu, February 28, 1913.

Hon. W. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry.

Sir:—I beg to report on the work of the Division of Animal Industry for the two months ending February 28, 1913, as follows:

### *Cattle Diseases at Pupukea, Oahu.*

For the past six or eight months Mr. F. S. Lyman at Pupukea, Oahu, has been losing cattle, mostly milch cows or young animals, a total of fifteen or twenty having died during the

period. Owing to the distance from Honolulu and to the belated reports reaching this office only when the carcasses would be too decomposed for examination, no actual investigation of the disease could be made. The owner was however instructed to secure samples of the diseased organs, if any, and to forward them for examination as soon as a new case should present itself.

On December 31 such samples were received, together with information to the effect that several animals had died during the preceding week. The accompanying description of the symptoms and post mortem changes were strongly indicative of anthrax, especially when considered in connection with the fact that both the owner and a farm hand, who had assisted in disposing of the dead animals, were suffering from pustules on the hands of a very suspicious character.

The sample forwarded for examination consisted of a piece of the small intestine. This was discolored to the extent of being almost black, the intestinal wall, as well as the mucous membrane, being considerably swollen and showing croupous well defined, contour. No sample of the spleen had been sent, but it was stated that this organ was swollen to several times or even diphtheritic areas of varying size, and of irregular, but its normal size and filled with black blood. That the disease was of extremely acute nature was evidenced by a statement to the effect that the dead animals, both milch cows, were apparently sound when they left the barn in the morning, after milking, and, when they did not return in the evening and a search was made, they were found dead, with blood exuding from the natural openings. There was therefore sufficient cause for suspecting anthrax, but careful microscopic examination of numerous slides prepared from the specimen failed absolutely to disclose the presence of the anthrax bacillus.

On January 2, a telephone message was received stating that another cow had died the night before, and no time was lost in reaching the ranch and locating the dead animal. The post-mortem examination revealed the following conditions:

Carcass considerably bloated, blood running from the nostrils and anus. The abdominal cavity contained several quarts of blood-colored serum. Mucous membrane of fourth stomach swollen and congested, though not to the same extent as the small intestines which were found to be discolored, as already described, in their entire length, and showing the same croupous spots and areas. The contents consisted of a dark, blood-colored grumous fluid. The spleen was fully five times its normal size, resembling on section a Texas fever or anthrax spleen. Neither the mouth, gullet or the three first stomachs nor any of the remaining organs, presented anything abnormal, except such changes as might be expected forty hours after

death. In the paunch or first stomach, however, which was fairly well filled with food, were found a large number of kukui leaves besides a number of fragments of a weed, *asclepias curassavica* L., which the owner had already suspected as the possible cause of the many deaths. This weed, belonging to the class commonly called milk weeds, is known to be poisonous, and several extensive outbreaks of disease among cattle in the southern part of the United States have been ascribed to this and closely allied species. The same plant is proclaimed in Australia as poisonous, but nothing definite is known in regard to the active principle it contains. From information gathered on the ranch the weed is said to have a deadening effect upon lips and fingers if handled or tasted, producing a local anesthesia somewhat similar to cocaine, from which facts however it is difficult to deduct any connection with such serious pathological changes as those observed in the dead animals. That no acrid poison is present is obvious from the normal condition of the mucous membrane of lips, tongue, mouth and gullet, but it is therefore not excluded that fermentation or contact with the gastric fluids may produce chemical changes in the poisonous principle of the plant, rendering it acrid after it reaches the fourth stomach, or else, that the supposed anesthetic properties may, when absorbed into the circulation, affect certain nerve centers and cause such vasomotoric disturbances as to account for the sudden effusion of blood into the intestines and the abdominal cavity, as well as for the greatly enlarged spleen.

A careful examination of the pasture in which practically all of the dead animals have been found, showed an abundance of the weed in question, a large proportion of the plants showing plain evidence of having been cropped by the cattle. The weed however is common throughout the Territory, and no previous epidemic is known to have resulted from it, nor are cattle known to eat it, as a rule; but a protracted drought has prevailed in this special neighborhood for the past two years, and grass and forage plants have practically disappeared, root and all, except such weeds as are usually left alone by the animals. The earlier deaths may therefore be ascribed to the cattle eating the surviving weeds, while the more recent deaths, which were then occurring almost daily, were due to the new weed springing up since the rains began a few weeks ago, the cattle eating them with avidity since hardly any grass came up. It is also possible, that the animals may have acquired a taste for the poison such as is known with regard to the loco weed.

As already stated, both the owner and a Japanese farm hand, were suffering from pustules and infected wounds on the hands, and as the local physician happened to call at the time, a slight pustule on the wrist of the owner was opened and

smears made for microscopic examination. The result was negative, and as the same proved the case with the samples secured from the dead animal, the anthrax theory might safely be excluded. A subsequent visit, when another cow had died, failed to furnish any additional light on the subject.

It was therefore decided to follow up the poison theory as far as possible, and the owner was requested to gather a sackful of the weed for experimental purposes. A five-months-old calf was obtained and every known method of inducing the animal to eat the weed was tried, but with little success. Even though nearly starved, being kept on a scant supply of dry hay, the animal absolutely refused to eat the weed, not even when cut up finely and mixed with bran mash or middlings. The experiment is therefore of value only in demonstrating or confirming the theory of an "acquired habit," as there can be no doubt that the weed was found in the stomachs of the dead animals. It also confirms, though to a slight degree only, that not all animals succumb to the temptation. An effort is now being made to induce the calf to eat kukui leaves as these are also known to be poisonous, but so far with little better success.

In the meantime it is to be hoped that the drought is broken and that more suitable feed than the asclenias has come within reach of the remaining animals. No further cases have been reported, and the only advice which could be given in the premises—to eradicate the weed as soon as possible—has been followed in so far as it could be done under the circumstances.

### *Glanders in Waipio Valley.*

Pursuant to the Board's instructions to visit Waipio Valley again within two months after the recent outbreak of glanders had been suppressed, in order to ascertain if possible if any infection might still remain there, I returned to Kukuilaele on the 11th inst. As the Board is aware a concerted effort on behalf of the plantations and ranches in that vicinity, had resulted in Mr. Akaka being provided with horses to take the place of the thirty-four head which were destroyed as being affected with glanders during my two previous visits. As a result of the generous action Mr. Akaka had been enabled to harvest his rice and market it, and was now busy plowing and getting his next crop in the ground.

A new, well-constructed stable, with room for forty horses, had been built on the site I had selected, and in accordance with the plans furnished him, and twenty-nine horses, costing about \$1750.00, or approximately the sum aggregated by appraisal of the destroyed animals, had been purchased and turned over to him. A careful examination of these horses failed

to show the slightest indication of glanders or any other disease. The stable was clean and well kept and formed a great contrast to the shed or shanty where the horses were formerly kept, and which had been completely demolished. As a question had arisen in regard to the actual value of some of these animals, and as I had been asked by one of the contributing parties to investigate this matter, the correspondence pertaining to which is appended, I requested a visiting veterinarian and stock expert to accompany me on my next visit to the valley. This gentleman, Dr. Schutte, who for a number of years has been connected with the Shipman ranches and who may possibly be an applicant for the vacant position of deputy territorial veterinarian for the Hamakua District, expressed himself, after examining each of the horses in question, to the effect, that with one or possibly two, exceptions the animals which had been provided Mr. Akaka at the instigation of this Board, and through the efforts of Mr. O. Sorenson, were in every respect satisfactory for the work and were cheap at the price, \$58.00 per head, which had been paid for them. The two exceptions were a mare too heavy in foal to do much work and another mare of rather vicious disposition and which it might require some time to break to work.

### *Reimbursement and Legislation.*

It would therefore seem as if this somewhat alarming outbreak of glanders has been brought to a satisfactory conclusion, and there remains only the question of public reimbursement of Mr. Akaka for the animals which were destroyed, in order to prevent the spread of this most dangerous and destructive of diseases. This subject has been fully discussed in my previous reports, as well as in the biennial report of this Division now being printed. I would therefore only call the Board's attention to the fact that the question of assisting Mr. Akaka with work animals to take the place of those destroyed by order of the Board, was instigated by the then acting president of the Board at whose direction also the animals were appraised with a view to reimbursement, and to respectfully submit if it does not devolve upon the Board to take the necessary steps for such reimbursement. A draft of an Act covering this subject, and based upon a similar Act recently passed by the State of Florida, has been prepared and is herewith submitted for such disposition as the Board may decide upon.

I beg also to request that the draft of an Act pertaining to bovine tuberculosis and glanders and which was returned to me, be given further consideration in so far as the various subjects are concerned which have not already been disposed of by other acts, as for instance the importation, sale or applica-

tion of tuberculin or mallein without authority from this Board,—the indemnification of owners of glandered horses who voluntarily report such cases to the Board—and obtaining permit of entrance to the Territory for animals by fraudulent means. I also beg to submit draft of a bill forbidding the turning out in pastures or on public highways of animals affected with or suspected of contagious or infectious diseases, as well as a copy of the San Francisco law pertaining to cruelty to animals.

### *Quarantine Stations.*

A final visit to the site of the Hilo Quarantine Station was made during my recent trip to Hawaii when, in conjunction with Dr. Elliot, the final plans and arrangements were decided upon, as per accompanying sketch. As I am instructed that tenders must be asked for covering the entire construction of the station, it will be necessary to have a few blue prints made, but otherwise I believe that my plans and specifications may be used without a costly redrafting of the same. After consultation with Mr. Kennedy and Mr. Forbes we have decided to recommend that the water supply of the station be obtained from a 10,000 gallon tank to be fed from the galvanized iron roofs of the sheds, the largest of which has a surface of 20,000 square feet. In comparison with a pipe line of 800 to 1000 feet this will mean a considerable saving.

I have also consulted Dr. Fitzgerald and submitted for his approval the plan for the Kahului station, as herewith appended, and which he says will be ample for all purposes, but until I have seen the site I cannot judge as to whether it can be built for the money allotted.

In regard to the Honolulu station a separate communication pertaining to the enlargement of the dog section is already in your hands. Estimates for concrete posts for the repair of the horse and mule pens have been asked for, but labor seems to be extremely scarce. These estimates are now on hand, but the price makes it impossible to even consider them. An ordinary 7' concrete post, 4"x4" at the top and 4"x6" at the bottom, corrugated on the two divergent sides, with four reinforcements of  $\frac{1}{4}$ " round iron, is estimated at \$1.25, whereas 6"x6" corner posts would cost anywhere from \$2.50 to \$4.00 according to their dimensions. When to this is added freight from Honolulu to Hilo the cost would exceed the available appropriation. These posts may however be made in Hilo and provision will be made in the specification, so that tenders for construction with either redwood posts or concrete posts may be submitted.

The plans and specifications are now finished and blue prints

are being made by the Public Works Department, and as soon as received tenders may be advertised for.

In order to enable me to make plans for the Kahului station it will be necessary for me to see the site provided for the purpose. I would therefore ask the Board to authorize me to go to Kahului on Friday, March 14, on the Lurline and return on the same boat Sunday.

Very respectfully,

VICTOR A. NORGAARD,  
Territorial Veterinarian.

#### REPORT OF ASSISTANT VETERINARIAN.

Dr. Victor A. Norgaard, Chief of Division of Animal Industry,  
Bureau of Agriculture and Forestry.

Sir:—I beg to submit herewith a report for the month of February:

#### *Tuberculosis Control.*

Very little has been done in this line during the past month, one cow only being tested and passed entering the dairy of Chas. Lucas, Niu. As the services of Mr. Joseph Richards, until recently City and County milk inspector, are no longer available, this most important work will of necessity be held up until it is definitely ascertained whether or not we are to be supplied with an assistant.

#### *Apoplectiform Septicemia in Chickens on Maui.*

This highly fatal and rapidly spreading disease has made its appearance in this Territory, among the chickens in the Homestead Lands of Haiku, Maui.

Mr. F. C. Krauss of the College of Hawaii recently received a letter from Miss E. Lindsay, one of the homesteaders of Haiku, Maui, describing the symptoms she had noticed during the outbreak among her chickens, also sending several specimens for examination taken from chickens dead of the disease. The letter together with the specimens were forwarded to this Division for examination, diagnosis and report.

Microscopical examination of the tissues revealed a Streptococcus in almost pure culture. From the symptoms as given in the letter together with finding streptococci in pure culture a diagnosis of Apoplectiform Septicemia was reported and all possible information regarding the control and prevention of the disease and also a B. A. I. circular written by Norgaard & Mohler dealing exhaustively with this particular disease, was forwarded to Miss E. Lindsay.

The organism which is the direct cause of this disease is to be found in the soil of certain localities, where it is normally saprophytic. Under certain conditions of moisture and temperature, however, it may multiply rapidly and assume a high degree of virulence, becoming a deadly parasite.

### *Symptoms.*

So sudden is the attack that few if any premonitory symptoms are observed. At the most the affected birds may show dullness, apathy and loss of appetite and not mingling with the flock. Death comes suddenly, the bird falling forward flapping the wings a few times in the death agony. The larger number of deaths occur, perhaps, during the night when apparently healthy birds going to roost in the evening are picked up dead in the morning.

### *Pathological Anatomy.*

Post mortem examination of birds dead of the disease shows them to be in good flesh, death coming so suddenly that no emaciation takes place. In the region of the breast and neck upon removal of the feathers numerous subcutaneous hemorrhages of irregular size and outline are found. Upon opening the abdominal cavity a varying amount of a sero-sanguinous fluid is found which coagulates soon after being exposed to the air. The liver is greatly enlarged and considerably congested, the kidneys are somewhat swollen and congested; the mesenteric vessels are greatly engorged with blood and intestines may show many hemorrhagic patches. The intestinal contents are more or less blood stained. The lungs usually show considerable congestion; the heart is pale, flabby and may show a few petechial hemorrhages.

### *Prevention.*

The organism which is the cause of the disease and which is found in every tissue of the body is obtained from a contaminated water supply, generally a water hole which receives the drainage from the surrounding land and to which chickens running at large have free access. The disease is spread by the droppings of the sick birds which contaminates both food and water. Medicinal treatment is of little avail as the onset of the disease is so sudden and birds apparently healthy at night are found dead in the morning.

All effort should be made to prevent the chickens from becoming infected and to stop the spread of the disease. This can be accomplished by putting them in runs and seeing that



they are supplied with pure drinking water in utensils which can be thoroughly cleaned and disinfected. Careful watch should be kept of the flock and all dead or sick fowls removed at once and the yards and house thoroughly disinfected.

### *Coccidiosis of Fowls.*

One small outbreak of this intestinal parasitism has been noticed among two pens of five weeks old chicks at Kaimuki. The owner had been losing his chicks at the rate of from five to seven a day and had finally appealed to this office for a diagnosis of the affection and advice as to its control.

### *Symptoms.*

Those beginning to show signs of sickness presented an unthrifty appearance, the feathers being ruffled up, dirty and looked as if they had been wet and all stuck together. They appeared dumpy, would remain by themselves and while in the first stages the appetite was good, in the final stages they ate but little and so became much emaciated. Diarrhoea soon set in with its weakening and debilitating effects, death taking place in from two to three days. The droppings were somewhat of a clay color containing at times considerable blood which gave them a brick-red appearance.

### *Pathological Anatomy.*

All the organs of the body appeared in a normal condition with the exception of the intestinal tract. The entire intestinal tract was somewhat inflamed but the most striking change was noticed in the caeca which were of a brick-red color and filled with granular fecal material deeply stained with blood and streaked with white. The cloaca contained a fluid, offensive material also brick-red in color, at times strongly resembling pure blood.

### *Etiology.*

Microscopical examination of the contents of the cases and cloaca revealed immense numbers of the *Coccidium Avium*. This coccidium is usually elliptical in shape with a thin shell and, in the state of cyst, measures from 24 to 36 microns long by 12 to 22 microns broad. It is passed out of the body with the feces and in the water or moist earth undergoes further development to be finally taken into the system again with contaminated food or water and reach its final stage of development in the epithelial cells of the intestines.

Intestinal coccidiosis of the fowl often occurs as an epizootic

and attacks nearly as many adults as young chicks. In very young subjects the course of the malady is very rapid while in adults the disease may continue for one or two weeks and it may even pass into the chronic state; the birds are then transformed into veritable skeletons and eventually succumb to progressive wasting and emaciation. The mortality often reaches 60 to 70 percent.

In the state of cocyst more or less advanced, the coccidia of the fowl may exist from one year to another in the damp soil of the poultry yard. They are injected by the birds with their food and water. The most severe outbreaks occur in summer in artificial yards and particularly where air and light are insufficient. It is possible that the disease may be introduced by eggs used in breeding, for Eckhart has found coccidia on the shell and in the white of the eggs from fowls attacked with coccidiosis.

### *Prophylaxis.*

Medicinal treatment does little good in a parasitism of this nature. All affected birds should be removed immediately and destroyed; the place thoroughly cleaned and disinfected, plenty of sunlight let in, and all moist places dried up. The flock should receive plenty of pure drinking water from a source known to be free from contamination and frequently renewed. The feed should be kept where contamination is impossible. Strict cleanliness, thorough disinfection of yards, houses, etc., and plenty of air and sunlight will prevent severe outbreaks of this disease.

### *Importations of Live Stock at the Port of Honolulu for the Month of February.*

During the month fifteen steamers were met and boarded, eleven of which carried consignments of live stock, all of which were inspected and admitted into the Territory. The tabulated list of live stock is as follows.

- Feb. 3.—*S. S. Virginian, Seattle*:  
18 horses, S. MacPherson.
- Feb. 5.—*S. S. Sierra, San Francisco*:  
1 dog, J. Van Camp.  
46 crates poultry.
- Feb. 6.—*S. S. Tenyo Maru, Orient*:  
9 crates pheasants.
- Feb. 12.—*S. S. Lurline, San Francisco*:  
19 crates poultry.  
26 mules, H. H. & Co.  
1 dog, J. J. Fitzgerald.
- Feb. 18.—*S. S. Sonoma, San Francisco*:  
1 dog, Bertha Godlewski.  
4 crates poultry.

- Feb. 18.—*S. S. Wilhelmina, San Francisco*:  
 1 dog, O. A. Steven.  
 20 crates poultry.
- Feb. 18.—*S. S. Hilonian, Seattle*:  
 10 horses,  
 15 mules, Schuman Carriage Co.
- Feb. 17.—*S. S. Persia, Orient*:  
 1 crate game chickens.
- Feb. 21.—*S. S. Mongolia, San Francisco*:  
 1 crate ducks,  
 2 dogs, H. G. Smart.
- Feb. 25.—*S. S. Honolulan, San Francisco*:  
 4 horses,  
 10 mules, Hon. Plant. Co.;  
 26 mules, Schuman Car. Co.  
 18 crates poultry.

Respectfully submitted,

LEONARD N. CASE,  
 Asst. Territorial Veterinarian.

## REPORT OF FOREST NURSERYMAN.

Honolulu, February 28, 1913.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir: I herewith submit a report of the work done by the Forest Nurseryman during the month of February, 1913.

### Nursery.

	Distribution of Plants.			Total
	In seed boxes	In boxes transplanted	Pot Grown	
Sold . . . . .	.....	575	627	1202
Gratis .. . . .	.....	800	399	1199
Total . . . . .	.....	1375	1026	2401

### Collections.

Collections on account of plants sold amounted to.....	\$24.35
Rent of Building Nursery Grounds.....	35.00
Total . . . . .	\$59.35

*Plantation Companies and Other Corporations.*

The distribution of trees during the month amounted to 198,000 assorted Eucalyptus in seed boxes and 1000 in transplant boxes. A total of 199,000. The balance of trees ordered for this season's planting amounts to 50,000 seedlings and 6000 in transplant boxes ready to set out. These will be delivered during the month of March.

*Experimental Garden, Makiki.*

The old boiler which we have been using for a sterilizer for the past five years gave out and commenced leaking in several places. To keep the work going we had to make a patch with a piece of boiler plate which we bolted on to the bottom of the sterilizer. This temporary repair will not likely last long and it might be wise to make arrangements to get another sterilizer so that the regular work may not be delayed. We are at present trying to get up a stock of trees to be ready for orders that are likely to come in.

*U. S. Experimental Planting, Nuuanu Valley.*

The man has been doing the regular routine work, namely hoeing and keeping down grass and weeds.

Respectfully submitted,

DAVID HAUGHS,  
Forest Nurseryman.

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DIVISION OF ENTOMOLOGY.

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Honolulu, February 28, 1913.

Honorable Board of Commissioners of Agriculture and Forestry.

Gentlemen: I respectfully submit my report of the work of the Division of Entomology for the month of February, 1913, as follows:

During the month there arrived 32 vessels of which 22 carried vegetable matter and one vessel building sand for concrete work.

Disposal.

	Lots	Parcels
Passed as free from pests .....	765	20,853
Fumigated . . . . .	34	46
Burned . . . . .	4	9
Total inspected .....	803	<u>20,908</u>

Of these shipments, 20,729 packages came as freight, 93 packages in the mail and 86 packages as baggage.

*Rice and Bean Shipments.*

During the month 13,010 bags of rice arrived from Japan; also 1250 bags of beans. All were found free from infestation and were passed.

*Pests Intercepted.*

Thirty-five packages of fruit and 11 packages of vegetables were found in the baggage of passengers and immigrants from the Orient. Being prohibited, they were seized and burned.

In the packing material about some rose plants from Sydney, Australia, I found several young snails (*Helix aspersa*). This species feeds on decaying vegetation and is classed more as a scavenger than a destroyer of plant life. The snails were hibernating as the opening of the shell was closed by a membranous operculum. This is a good illustration of the possible chance of accidentally introducing such creatures into the Territory and on account of this I have always ordered all packing material destroyed and replaced with moss grown in the islands. A leaf-eating beetle (*Chrysomelid* species) was also found crawling in the same material.

*Hilo Inspection.*

Brother M. Newell reports the arrival of eight steamers and two sailing vessels. Six steamers brought vegetable matter consisting of 97 lots and 2037 packages. All being free from soil and pests they were passed.

*Inter-Island Inspection.*

During the month of February 54 steamers were attended to and the following shipments were passed:

Plants.....	43 packages
Taro .....	688 bags
Lily root...	12 packages
Vegetables....	1 package

Total..... 744 passed after inspection.

The following packages were refused shipment:

Plants.....	10 packages rejected on account of soil
Fruit....	16 packages prohibited

Total..... 26 packages refused shipment.

Respectfully submitted,

E. M. EHRHORN,  
Superintendent of Entomology.

## THE GARDEN OF EDEN.

## SOMEWHERE IN ARABIA.

*The Geographical Journal* for August, 1912, reports a lecture delivered by Sir William Willcocks, K. C. M. G., before the Royal Geographical Society on June 10, 1912. Lecturing in November, 1909, in this hall, on "Mesopotamia, Past, Present and Future," he said: I placed the Garden of Eden of our Bible on the upper Euphrates between Anah and Hit. Here must have been the first civilized settlement of the Semites, the ancestors of the children of Israel, as they moved down from the north-west. And it may interest some to know that in the latitude of this region, not far from Damascus, wild wheat plants have within recent years been discovered. The wearing down of the cataracts deprived the settlers of the waters of the friendly river which had watered their garden, and they traveled eastwards and could see behind them nothing but the bitumen springs on the east of Eden, which seemed to them like flaming swords in the hands of the offended seraphim. Like all early peoples they called themselves the sons of men who had already conquered the Tigris-Euphrates delta, and among whom had settled those of their sons whose hands were stained with blood and who could no longer be permitted to reside in the tents of their tribe.

As these people understood nature, the river by itself could not begin life until its waters had mingled with those of the sea, and from their union under the action of the flux and reflux of the tides sprung the marshes where life began on earth. As a matter of fact, salt water never reaches the marshes owing to the delta of the Karan lying between them and the sea.

The effect of the 10-foot tide in the gulf is communicated to the rivers, and travels up nearly 100 miles, but no salt water gets into the marshes. To the writers of these very early epics the Deep was a fresh-water deep.

With translations of the Babylonian tablets of creation in my hand, and the plans and levels of the country before me, I have endeavored, on the spot, to give local color to the passages describing the Garden of Eden of Sumer and Akkad. After some thousands of years, the Euphrates in these reaches is again traversing wide marshes. For some 70 miles in length the river has left its old channel and, flowing over a flat plain some 12 miles wide, is covering it with 2 or 3 feet of water. I have seen Arabs taking reeds and earth and throwing up well-protected banks in the time of low supply and so enclosing areas of land for cultivation and habitation, which will be safe from the attacks of the Euphrates.

## THE VIRILE BABYLONIAN.

When human beings first appeared on the earth and for many a generation afterwards, men could only have just held their own against wild animals and, while their dwelling-places were surrounded by forests and jungles, the unending struggle must have left them but little time to make any real advance in civilization. It was far different in oases of Arabia and practical oases like Anah and Hit on the upper Euphrates. Here it was possible for men to destroy the existing wild beasts and as their numbers could not be recruited out of the deserts, they were exterminated; and men had leisure to become gradually civilized. "Amalek was the first of the nations," was spoken with knowledge of the Arabs stretching from the delta of the Nile to the upper Euphrates. Living in tents and using gourds for vessels, they have left no traces such as we see in Egypt and Babylonia; but Arabia has been able to pour forth from her parched loins her virile sons who began the subjugation of both the Nile valley and the valley of the Euphrates. Everything in Egypt was easy and to hand: the Nile was and is the most stately and majestic of rivers and carrying a moderate amount of deposit creates no serious difficulties for the dwellers on its banks; the Garden of the Lord, the land of Egypt, is very fertile; and the climate is mild in winter and never parches in summer. Egypt, therefore, produced no world ideas. None of her sons were possessed of a fine frenzy with eyes glancing from heaven to earth and earth to heaven. It was far different with Babylonia. The Tigris and Euphrates in flood are raging torrents and their ungoverned and turbid waters need curbing with no ordinary bridle. Babylonia's soil is very fertile, but the winters are severe indeed and the summers savage and prolonged. The range of temperature is between 20° and 120° in the shade. Brought up in a hard school they possessed virile intellects. Moses' first contact with Babylonian beliefs and creations in the house of the priest of Midian on the slopes of Horeb, entranced him: in the burning bush of the deserts he saw the footsteps of the Almighty, while heavenly voices spoke to him out of the storms raging on the summit of Sinai. In connection with this we must remember that Moses' wife is called, in one place, a daughter of the priest of Midian, and in another a Cushite or Babylonian woman. Her father was probably a learned Babylonian exercising priestly functions among the Arabs.

The extraordinary dry heat of the summer, by day and by night, gives a luster to the stars, a distinctness to the constellations, and a glow to the fields of powdered stars (called here the milky way) which cannot be conceived by one who has not spent the whole summer in the plains of Shinar. The sons of Sumer and Akkad were the first astronomers and thinkers of the world. They divided the year into months, the months into weeks and

the weeks into days, on a system which lasted to the days of Julius Caesar. They created the sabbath day, peopled heaven with Cherubim and Seraphim, and they first saw Orion leading out the starry hosts of heaven. Perennial irrigation was their creation and that in the face of floods such as the Tigris and Euphrates bring down. By their skill they introduced wheat on the Earth, but in the domain of abstract thought they were especially predominant. In evolution they out-Darwined Darwin.

Seeing the delta of the rivers which had been at the mercy of the high floods, gradually reclaimed, and steady progress on every side of them, they cast their thoughts back and saw as the beginning and origin of everything, infinite chaos represented by the devastating spirit of the floods of the river mingling with the wasteful spirit of the sea and producing monstrous births; but less monstrous than themselves. Tiamat, through her union with Apsu, gave birth to Lakhmu and Lakhamu, and ages increased, and Ansar and Kisar were born. Long were the days and different gods came into existence; then long intervals of time elapsed and the good gods were evolved, each better than those who gave them birth, until finally Marduk appeared, the greatest and most beneficent of all.

#### SITE OF THE GARDEN.

Now, where was the original home of these interesting people, to whom we all owe so much? For reasons already given, it must have been in some country of oases surrounded by deserts, and Arabia is such a country, and at their very doors. The oases of Arabia are close at hand to both the Nile and the Euphrates and the natural overflow of the surplus population would be Egypt and Babylonia.

Every part of the Euphrates delta, from Hit to the Persian gulf, has at some time or another been called "Eden," the irrigated and cultivated plain, as distinct from "Kura," the unirrigable hill or plain. So in Egypt today the "reef" is the irrigated plain and everything else is the "jebel," the desert where there is no rain and hill or mountain where there is rain. Soil and climate are eminently suited to fruit gardening. From date palms and oranges to peaches and plums every fruit tree is at home. The date palm is really the indigenous tree of the country. "Put its feet in water and its head in hell and it will do all the rest," is the saying of the people.



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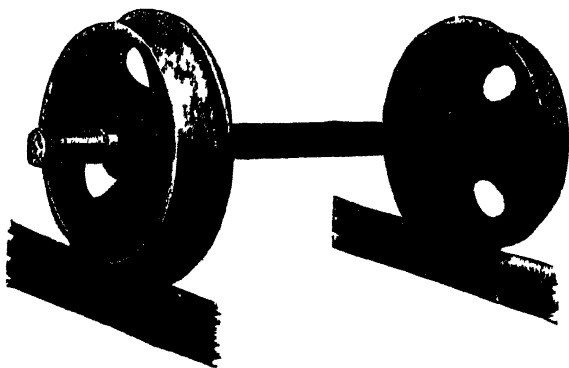
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# THE HAWAIIAN FORESTER AGRICULTURIST

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VOL. X.

APRIL, 1913.

No. 4.

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Again the Superintendent of Entomology, in his report for March, is able to show various dangerous pests refused admittance to the Territory. The value of the Division of Entomology to the islands can hardly be measured in dollars.

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There is much gratifying information in the reports of the Superintendent of Forestry and the Forest Nurseryman for March. The establishing of three additional forest reserves on Oahu, containing an aggregate of 6368 acres, with another one projected for the mountain section back of Honolulu, is striking evidence of advancement. Then there is the distribution of plants for forestation in the country and gardens and orchards in town—about sixty thousand to corporations and over four thousand to the general public in one month—showing practically universal interest in forestry and domestic arboriculture.

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The reports of the division of animal industry for March contain evidence that the island of Oahu, constituting the City and County of Honolulu, is now practically rid of tuberculosis in dairy herds. There is also gratifying testimony of a high degree of sanitary conditions prevailing in most of the dairies of the island. This wholesome state of affairs with regard to the sources of Honolulu's milk supply, as well as that of the teeming plantations, has been brought about from quite antipodal conditions that existed three years ago. It is all much to the credit of the Division of Animal Industry and the Board of Supervisors of the municipality, the latter having started the work of redemption by the passage of a pure milk ordinance.

## CLEAN CULTURE IN AUSTRALIA.

Under the heading of "Fruit Fly and Codlin Moth," the Agricultural Gazette of New South Wales makes the following remarks. They show the importance placed on clean culture in beneath the Southern Cross, emphasized as it is by penal laws—something that is needed in Hawaii:

"It seems almost incredible that any fruit-grower who is alive to his own interests would allow fly or moth-infested fruit to lie on the ground until the grubs have left them, but such is the case, and it is to these careless growers that we are usually indebted for the breeding and spreading of many of our pests. It is also these growers who give so much extra trouble to our inspectors under the fruit pests act, in seeing that no neglect takes place. It may be well for such careless growers to remember that they are a menace to their neighbors, and that by neglecting to pick up and destroy all fallen and infested fruit, they are liable to a fine. Any fruit-grower would be quite justified in notifying the department whenever he is sure that his neighbors are trying to shirk their responsibilities in this matter."

## FRUIT FLIES.

Several months ago fruit of *Eugenia malaccensis* Linn., obtained in the market, was found to be infested by dipterous larvae, which at first were thought to be of the Mediterranean fruit fly (*Ceratitis capitata* Wied.), but upon determination they were found to be of the mango fruit fly (*Dacus ferrugineus* Fabr.). These flies are quite common through Java, India, Ceylon and Amboina, as well as the Philippines, and cause considerable damage to fruit. They do not confine themselves to any one class of fruit, but are particularly injurious to the mango and citrus fruits. Over fifty species of the genus *Dacus* have so far been described from Malaysia.

A late shipment of *Citrus hystrix* DC. from Bohol contained numerous dipterous larvae which have not as yet emerged, but which are in all probability of the above species.—C. R. Jones, Entomologist, in *Philippine Agricultural Review*.

## SUNFLOWER POTASH.

The south of Russia is noted as the great sunflower district of the world, but only recently have the stalks, usually considered a useless by-product, been made to produce potash. The ashes of these stalks are rich in potassium salts and some 7000 tons of this potash fertilizer are annually exported from the north Caucasus district. When we realize what an almost infinitesimal part of the weight of the plant is its ashes, we are forced to regard the sunflower crop of that district as something more than remarkable.—*Philippine Agricultural Review*.

*BOARD OF AGRICULTURE AND FORESTRY.*

(Honolulu Star-Bulletin, March 22.)

Positive ground was taken against the introduction to Hawaii of any bird that might possibly become a nuisance, at a meeting of the board of agriculture and forestry yesterday. It was the house wren that was particularly tabued, it having been mentioned in a list of birds recommended for importing. At the same time official salt was held out for the tails of a species of quail and the teal duck, the members being in favor of increasing the number of game birds here.

The meeting was held at the office of the Waterhouse Company, Ltd., Stangenwald building. With President Walter M. Giffard were present Commissioners H. M. von Holt and John M. Dowsett, and Ralph S. Hosmer, superintendent of forestry.

Reports of divisions for January and February were received. A favorable report of the forestry committee on the Makua, Kuohalu and Nanakuli proposed forest reserves was adopted.

Mr. von Holt made an oral report that the fencing of the Nanakuli forest reserve was required by the existing lease.

There was a discussion of boundaries of the Paumalu forest reserve on this island, with regard to encroachments by adjacent property owners. The question seemed to turn on the water privileges of homesteaders.

Mr. Hosmer explained the situation. There were springs in two parcels of land, which had been reserved, one of fourteen and one of fifteen acres, each surrounded by homesteads. He said the matter was now one of policy.

The matter was referred to the forestry committee for investigation.

It was announced that Mr. Hosmer would go to Maui next week to investigate encroachments of cattle on the Polipoli Springs reservation.

J. F. Rock, botanist, wrote asking for assistance in the publication of his book on Hawaiian trees. The matter was referred to the finance committee.

Mr. Hosmer requisitioned \$200 for a sterilizing garden, which was granted.

An appropriation to pay for additional forest fire protection service in the Manoa section was allowed.

Mr. Hosmer wrote recommending a reservation of the watershed back of Honolulu, and asking that restriction be placed, in the meantime, on the cutting of trails between Nuuanu and Palolo valleys. In reply to a question he explained how trails not properly laid out might increase the danger of fire. His idea was that the thing should be under definite control, which was not the case now.

Mr. von Holt said he had asked the question because he did not think the board should take arbitrary action in a matter in

which the public was interested. He related his own experience in cutting trails in the Waialua district, where the vegetation had speedily covered the ground again.

The proposals of Mr. Hosmer were unanimously confirmed.

Prof. W. A. Bryan of the College of Hawaii wrote the board on behalf of the introduction of the house wren, the teal duck and a species of quail.

There was united opposition to the wren as being a bird that was liable to show no discrimination between friends and foes of vegetation in feeding upon insects. As to the quail and teal, the members agreed that such game birds should be welcomed.

Dr. Norgaard sent in a requisition, with plans and specifications, for an addition to the kennels at the animal quarantine station. The estimated expenditure was authorized.

On the recommendation of Entomologist Ehrhorn, the board appointed E. R. Bivens honorary plant inspector at Kahului, in place of M. Eaton, resigned.

President Giffard brought up the matter of shipment of fruits from Maui to Oahu, a question having been raised as to the expediency of enforcing the regulation against such traffic, in view of the fact that this island has the fruit fly and the Maui fruits in question are clean.

It was voted that the executive officer notify the president of the Maui Chamber of Commerce that the shipment of fruits from Maui would not be interfered with, for the present at least.

The president reported that he had received a cablegram from Professor Silvestri announcing his arrival at Capetown with five species of parasites of the Mediterranean fruit fly, three of them certain and two doubtful, and would proceed to Australia, where he hoped to propagate colonies of the certain species in particular.

He also reported that Professor Muir, who was going to leave for Japan next week, would, through the courtesy of the Planters' Association, secure for the board a parasite of the Japanese beetle if he ran across such.

The meeting discussed pending legislation relating to the department; also sundry financial matters.

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## DIVISION OF FORESTRY.

Honolulu, April 1, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I have the honor to submit as follows the routine report of the Division of Forestry for the month of March, 1913.

### BIENNIAL REPORT.

During the first part of the month not a little of my own time was occupied in reading proof and attending to other details in

connection with the publication of the biennial report of the Board for 1911-1912.

The full report—a book of 258 pages, illustrated by 36 full page plates—was issued on March 19. The first copies were sent to the Governor and Members of the Legislature on that day. Since then a very general distribution of the report has taken place, to persons on the Board's mailing list throughout the Islands.

The edition numbered 1750 copies of the full report, and 750 each of the separates of the three divisions. Any resident of the Territory may obtain a copy of the report upon application to the Clerk of the Board of Agriculture and Forestry, Box 207, Honolulu.

#### FOREST RESERVES.

At the meeting of the Board of Commissioners held on March 21, three forest reserve projects on the Island of Oahu were approved and ordered sent to the Governor with the request for a public hearing. The proposed reserves are Kuaokala, 434 acres; Makua-Keaau, 4924 acres, and Nanakuli, 1010 acres—all in the District of Waianae.

During the month the Survey Office completed a map of the mountain section back of Honolulu, on which I have sketched a line which I recommend as the forest reserve boundary. As soon as the official description of this line is ready, a report recommending the creation of the Honolulu Forest Reserve will be submitted to the Board for its approval.

#### TRIP TO MAUI.

The last few days of March I spent on the Island of Maui, making an inspection of work being done in fencing and forest planting, under Government Land Office leases, in the Kula Forest Reserve, and of other similar work in the Makawao Forest Reserve. This trip forms the subject of a special report shortly to be submitted to the Board.

#### FOREST FIRES.

On the afternoon of March 13 there occurred a brisk grass and brush fire on the slope of Pacific Heights that for a time looked as if it might cause somewhat serious trouble. A Japanese named Nakana, on Laini road, Lower Nuuanu Valley, was clearing land and burning brush. Left for a little while unwatched, the fire got away, and spread up the steep, grassy slope to the ridge of Pacific Heights. Here its advance was stopped by four men from the Honolulu Fire Department and a squad of a dozen Territorial prisoners sent from the jail, upon request, by High Sheriff Henry.

Thanks to Mr. E. M. Ehrhorn, the Superintendent of Forestry



and the Forest Nurseryman were got quickly to the scene of the fire by automobile. Nakana had secured ten or twelve men who fought the fire from below, under the direction of Mr. Haughs, while on the ridge the firemen and prisoners, with the Superintendent of Forestry, kept it from crossing into Pauoa Valley. Had the fire got over into Pauoa, it might easily have run up to the forest.

The thanks of this department have already been officially given to the Chief of the Fire Department and to High Sheriff Henry for their prompt and efficient response to our call for help. But it is only fitting that an additional expression of appreciation should here be made public, for without their assistance this fire could not have been checked when and where it was.

Earlier in the month, on March 9, a grass fire on the lower Ewa ridge of Kalihi Valley, called the Forest Nurseryman and one laborer from the Government Nursery to that valley, where they remained on duty from late afternoon to well into the evening, when the fire burned itself out on a rocky slope.

On Sunday, March 30, a grass fire is reported to have burned over five or six acres on the land of Honouliuli, Ewa District, Oahu, above the holdings of the Kunia Development Company. This fire is supposed to have been started by pig hunters, but no positive evidence could be secured. The fire was put out by a gang of about 50 men got together by the Kunia Development Company. It was stopped in the edge of the trees on the slope of the Waianae Hills.

The only way to prevent forest fires is for everyone to be extremely careful. Using the Pacific Heights fire as a text, the Superintendent of Forestry prepared warning editorials which were given good space in both of the local newspapers, the *Advertiser* and the *Star-Bulletin*.

The rains of the latter part of the month have now temporarily reduced the forest fire danger but only until the next dry time.

The use of fire anywhere near the forest must be strictly guarded. In a dry time it is imperative that every precaution be taken.

#### NEW FIRE WARDENS.

Several changes in the staff of District Fire Wardens were made at the Board meeting of March 21, 1913, by the appointment of the following gentlemen for the districts named:

#### *Oahu.*

H. Bloffield Brown—In and for that portion of the District of Ewa, lying to the east of the main government road between the land of Waipio and the Kaukonahua gulch.

George M. Robertson—In and for that portion of the District of Waialua lying between the Halemano and Opaepala gulches.

George Wilson—In and for that portion of the District of Wai-  
alua lying between the Opauala gulch and the Koolauloa District  
line.

Otto Ludloff—In and for that portion of the District of Koo-  
laupoko, extending from and including the land of Heeia to the  
land of Kailua.

### *Maui.*

Arthur K. Jones—In and for the Districts of Honuaula and  
Kahikinui.

### *Hawaii.*

George Gibb—In and for that portion of the District of Kau,  
extending from the land of Punaluu to the Kona District line.

Donald S. McCalister—In and for that portion of the District  
of Hilo extending from and including the land of Kukaiau to the  
Hilo District line.

During the past month a fresh supply of cloth fire-warning  
notices, with a circular letter regarding the posting of same, were  
sent out to all the district fire wardens throughout the Territory.  
The publicity thus given to the forest fire law undoubtedly helps  
to make people more careful about using fire near the forest in  
that it brings to their attention the penalties provided by law in  
case of a fire spreading through carelessness or neglect.

### VISIT OF THE LEGISLATURE.

On Friday afternoon, March 7, the members of the Senate and  
House of Representatives visited the offices of the Board of Ag-  
riculture and Forestry. Each of the Chiefs of Divisions spoke  
briefly to the party on the work and needs of his Division.

In company with the Executive Officer of the Board, the Super-  
intendent of Forestry appeared before the House Committee on  
Agriculture on March 12, in the interest of pending legislation.

### REPORT OF THE FOREST NURSERYMAN.

As usual, the report of the Forest Nurseryman for the past  
month is transmitted herewith. In this connection it may not be  
inappropriate, in view of newspaper comment that has recently  
been made on the subject, to call attention to the fact that as a  
part of his work of giving advice on the care of trees, the Forest  
Nurseryman, Mr. David Haughs, has for some time past, and  
especially in the last few months, given considerable time to an-  
swering repeated requests for advice from persons interested in  
taking proper care of street trees. This assistance has been given  
both to individuals and to organizations. It is one of the ways

in which the Division of Forestry is of practical service to the people of this community.

Very respectfully,  
RALPH S. HOSMER,  
Superintendent of Forestry.

#### REPORT OF FOREST NURSERYMAN.

Honolulu, March 31, 1913.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir:—The following is a report of the work done during the month of March, 1913:

#### *Nursery.*

##### *Distribution of Plants.*

	In Seed Boxes.	In Boxes Transplanted.	Pot Grown.	Total.
Sold . . . . .	....	500	90	590
Gratis . . . . .	1000	186	2372	3558
	1000	686	2462	4148

#### *Collections.*

Collections for the month are as follows:

Plants sold . . . . .	\$ 4.05
Cordwood from Tantalus . . . . .	30.00
Rent of building, Nursery grounds . . . . .	35.00
Total . . . . .	\$69.05

#### *Grass Fire at Honouliuli Ranch.*

On Sunday afternoon, April 6, at 1:30 o'clock, Mr. A. W. Van Valkenburg reported that a grass fire was raging on the lands of the Honouliuli Ranch mauka of the Kunia Development Company's lands. Mr. Van Valkenburg at once called all the available men in the neighborhood to his assistance and after a few hours' hard fighting the fire was put out. Mr. Van Valkenburg reports that the area burned over amounted to about six acres which consisted of grass and brush. No traces of the person or persons who started the fire could be found.

#### *Plantation Companies and Other Corporations.*

Orders received during the month amounted to 7000 trees ready to set out. These are being propagated and will be delivered as

soon as they are ready. Trees to the number of 59,596 were distributed as follows:

In seed boxes.....	50,000
In boxes transplanted.....	3,020
Pot grown .....	6,576

Total..... 59,596

The above number completes all the orders on file with the exception of those received during the month.

*Experiment Station, Makiki.*

The men are busy transplanting and doing other routine work. Our stock both at Makiki and the Nursery has been so greatly reduced owing to the large demand for trees that it will take some time to again replenish it.

*U. S. Experimental Planting, Nuuanu Valley.*

The man has been doing the regular routine work and the different plots are now in good condition. Arrangements are being made to start transplanting a number of new varieties of Eucalyptus, and a small nursery for that purpose will be located alongside of the quarters just below the dam. The planted part will not require much more care, and the man can spend most of his time transplanting and getting trees ready for more plots.

Very respectfully,

DAVID HAUGHS,  
Forest Nurseryman.

DIVISION OF ANIMAL INDUSTRY.

Honolulu, March 31, 1913.

Hon. W. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry.

Sir:—Reporting on the work of this Division during the month of March, my principal effort has been directed toward the completion of plans and specifications for the quarantine stations of Hilo and Kahului, and to the enlarging and reconstruction of the Honolulu quarantine station.

In my report for the preceding month, February, I recommended that six additional kennels be built, the number of dogs arriving here constantly demanding such enlargement of the station, and as soon as I was notified that the Board had decided to grant this request I went to work to have it carried into effect. It proved, however, almost impossible to obtain carpenters or contractors who would undertake the work except at exorbitant

prices, one contractor asking nearly double the price of my personal estimate of the cost.

I finally secured a Portuguese carpenter with two laborers at respectively \$3 and \$1.50 each, who under my personal and constant supervision have now nearly finished the construction of the six new kennels. A statement of the cost to date is herewith appended.

Lumber, nails, hinges, etc.....	\$ 35.00
Wire fencing, 260 feet at 37½c.....	97.50
Two gates at \$7.50.....	15.00
Woven wire for tops.....	3.00
Stain and paint, etc.....	12.50
Labor to date, 8 days at \$6.....	48.00
Estimated cost to finish.....	50.00

Total.....\$241.00

This total, which exceeds my estimate of \$225 but slightly, and is far below the submitted bid of \$360, could only have been attained through my personal attention and supervision of the work. For this reason I am of the opinion that the Hilo and Kahului stations can be built economically only if undertaken in the same manner. Tenders will, however, be asked for, but if the bids should prove exorbitant or beyond the sum appropriated for the purpose, I feel sure the stations can be built under my personal supervision with the means at hand.

Six blue prints and an equal number of specifications have now been prepared for the eventual bidders, and it is suggested that tenders be advertised for in one Hilo and one Honolulu paper, through the Department of Public Works. Three of these sets should be placed with the Deputy Territorial Veterinarian at Hilo and the other three remain with the Public Works Department here.

The plans and specifications for the Kahului station will be ready in a few days.

The unusually large number of horses and mules which have arrived here during the past two or three months, as well as those expected to arrive shortly, have made it impossible to undertake any extensive reconstruction work at the Honolulu station, and I have therefore been forced to limit this work to the replacement of posts and the temporary repair of fences until one or more of the most damaged paddocks can be spared for actual rebuilding.

#### *Bovine Tuberculosis Control Work.*

In connection with this most important work I have asked my assistant, Dr. Case, for a concise statement as to the present status of this work, a copy of which is herewith appended. From this it will be seen that no milk from tuberculous cows is allowed to

reach the consumers in the city or county, a condition which should be extended to the entire Territory. In any case it is about time that the fourth annual test should be begun in order that the few remaining infected animals may be apprehended before they have a chance to again distribute the disease to other animals. In this connection I have closely followed the work being done in other States and especially in California, where there is now a strong tendency to revert to the physical examination method, as practiced in Germany, and to resort to the tuberculin test only when the bacteriological examination of the milk shows the presence of the tubercle bacillus. In this matter California has proven herself years behind many of the other States, and the obvious result, that is, the constant spread and increase of the disease, must become apparent in a very short time. Without the constant and conscientious application of the tuberculin test, and the elimination of *all* infected (reacting) animals from the dairy herds, tuberculosis, human as well as bovine, will persist and will continue to take its toll of human lives, especially of children whose principal food consists of milk. This fact is so incontrovertibly demonstrated and has so often been presented in these reports that it should not be necessary again to urge the necessity for continuing the work which has already given such great results. A glance at the table prepared by Dr. Case will show the preponderance of clean dairies, and this, in connection with the splendid work done by the Dairymen's Association, should be sufficient incentive to forge ahead and rid the dairy herds of this county at least of the last trace of infection, and then see to it that no new infection gains entrance, either from the other counties or from abroad. To continue this work, however, this Division must have another assistant (former municipal Milk Inspector Joe Richards is recommended), and the subject is brought up here because a number of the dairy owners in Honolulu are daily asking *when* the next test is going to be made. Many of the milk producers who are earnest in their endeavors to furnish clean milk are anxious to know whether their herds are still clean or whether the insidious infection may have returned since their animals were last tested. With the use of the automobile many of these cases could be attended to especially if the assistant above referred to were appointed, but without it nothing can be done. The daily and prolonged visit to the Quarantine Station requires the use of the horse and buggy, while the attention to incoming steamers and the inspection of imported stock must be done by means of street cars and hacks. As the machine is now in perfect shape except for a few minor repairs (speedometer, \$5, and new fenders, \$38—not absolutely necessary at the present time), I am informed that it can be used for some months at the actual cost of gasoline and oil. I would therefore recommend that the machine be returned to the Division for such work as it is deemed advisable not to postpone any longer than absolutely necessary.

In conclusion, I beg to recommend that the caretaker of the Station be provided with an assistant without further delay. No manure has been gathered for a number of months, and as it becomes more and more evident that one man is required in the dog division practically at all times, and that the feeding and care of from 50 to 75 horse and mules, even with the assistance of the owners' employees, necessitates the employment of another man, I would urgently recommend that provision be made for the same. Owing to the fact that there is no place where an additional man could be quartered, I doubt whether a reliable person can be obtained for less than ten dollars a week (citizen labor).

Trusting that your honorable Board will consider that the importation of live stock and other animals is a subject of the greatest importance when viewed from the standpoint of encouraging such importations and at the same time excluding infectious and contagious diseases, I would earnestly recommend that the above suggestion be given due consideration.

Very respectfully,

VICTOR A. NORGAAARD,  
Territorial Veterinarian.

#### REPORT OF ASSISTANT VETERINARIAN.

Honolulu, March 31, 1913.

Dr. V. A. Norgaard, Chief of Division of Animal Industry,  
Bureau of Agriculture and Forestry.

Sir:—I beg to submit the following report for the month of March, 1913:

#### *Tuberculosis Control.*

Replying to your request for a concise statement showing the present status of the tuberculosis control work on this island, I submit herewith in tabulated form, the work accomplished during the past three years—1910, 1911 and 1912—giving the total number of animals subjected to the test, the number passed, condemned and suspicious, and the percentage of reactors.

During the month only two family cows have been tuberculin tested, both of which passed.

#### Commercial Dairies, City of Honolulu:

	1910.	1911.	1912.
No. of dairies . . . . .	50	65	60
No. of animals tested . . . . .	1516	1538	2237
No. of animals passed . . . . .	1033	1386	2091
No. of animals condemned . . . . .	440	152	146

#### Private Dairies, City of Honolulu:

No. of dairies . . . . .	13	31	15
No. of animals tested . . . . .	28	70	31

No. of animals passed .....	23	67	28
No. of animals condemned .....	5	3	3
Country Dairies and Ranches, County of Honolulu:			
No. of dairies .....	9	34	32
No. of animals tested .....	573	2451*	3022*
No. of animals passed .....	539	2388*	2968*
No. of animals condemned .....	26	63	54

*Total Number Tested and Percentages of Tuberculous Animals.*

Year.	Total Tested.	Passed.	Cond.	Suspicious.	Pctge.
1910 .....	2117	1595	471	51	22.24%
1911 .....	4059	3841	218	..	5.39%
1912 .....	5290	5087	203	..	3.81%

A study of the above table shows a gradual extension of the work in the control and eradication of bovine tuberculosis. More territory has been covered each year, an increasingly larger number of animals subjected to the tuberculin test and a certain, steady decrease in the percentage of tuberculous animals in the dairy herds accomplished.

The figures and resulting percentages in the above table differ somewhat from those as given in the last biennial report because of the fact that in this computation the calendar year was used as a basis instead of the various tests designated as Nos. 1, 2 and 3. The difference, however, is slight.

A study of the work accomplished in 1912 will give an adequate conception of what is to be done in this direction this year on the fourth general test of the dairy herds of the city and county. In 1912, 107 dairies were visited, of which number 60 may be considered city dairies, 15 private dairies and 32 county dairies. A total of 5290 animals were subjected to the intradermal tuberculin test, of which number 5087 were passed and 203 condemned.

Of all the animals condemned during the years 1910, 1911 and 1912, a total of 892, we can conscientiously say that not one remains alive. The dairy herds are entirely free of condemned cattle and not a drop of milk reaches the consumer from cows known to be tuberculous. In the accomplishment of these great results we have been aided in every possible way by the dairy owners themselves, which speaks volumes for our consistent campaign of education.

The sanitary condition of the dairies has advanced step by step with the eradication of tuberculosis from the herds, and while there is still room for improvement, sanitation has advanced one hundred per cent, over and above conditions in 1910. The

\*Primarily range cattle.



frequent visits paid to the dairies in the course of testing has been a potent factor in keeping hygienic methods before the owners and bringing about their adoption. While there is no dairy which could be termed excellent, with the exception of that of the College of Hawaii, which is managed with the model type constantly in mind, there are many good, many fair and none which can be called bad.

Standing between the producer and consumer, and handling more than three-quarters of the milk produced in the city and county, we have the Honolulu Dairymen's Association, a co-operative institution in which many of the leading dairymen are represented, and which was designed to furnish the city with an ideal milk supply.

I think I am correct in stating that it is the present policy of the Association to accept milk from only those dairies whose sanitary and hygienic conditions entitle them, under the Milk Ordinance, to sell milk. While in some instances milk has been accepted from dairies not permitted, under the ordinance, to sell milk, it has been, I believe, through ignorance on the part of the management, to the exact conditions and standing of said dairies. Upon reaching the Association the milk is electrically purified, the result being a clean, palatable product with excellent keeping qualities, and having a very low bacterial count ranging from 500 to 1000 organisms per cc.

### *Importations of Live Stock.*

During the month of March twenty-two steamers were boarded, eight of which were found carrying live stock, as follows:

March 3—S. S. Sierra, San Francisco: 1 dog (Irish terrier), Paul Isenberg; 36 crates poultry.

March 11—S. S. Lurline, San Francisco: 4 mules, A. W. Eames; 24 mules, Club Stables; 1 dog (English setter), G. L. Keeney; 10 crates chickens, N. B. Lansing; 1 crate chickens, W. F. X. Company.

March 17—S. S. Ventura, San Francisco: 1 crate chickens, Yee Hop.

March 18—S. S. Wilhelmina, San Francisco: 29 crates poultry.

March 21—S. S. Korea, San Francisco: 1 dog (Airedale), Lieut. McCleave.

March 21—S. S. Mexican, Seattle: 2 horses, U. S. A.; 3 dogs (water spaniel), Capt. W. S. Sinclair.

March 25—S. S. Honolulan, San Francisco: 46 mules, Schuman Carriage Company; 2 mules, M. Andrade; 1 horse, E. Duisenberg; 4 Berkshire boars, Hawaii Meat Company; 1 dog (pointer), P. Isenberg; 23 crates poultry.

March 1—S. S. Sierra, San Francisco: 10 crates white leg-

horns, C. A. Bortfeld; 12 crates white leghorns, N. E. Lansing; 1 crate brown leghorns, F. L. Waldron.

Respectfully submitted,  
L. N. CASE,  
Assistant Territorial Veterinarian.

## DIVISION OF ENTOMOLOGY.

Honolulu, March 31, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of March, 1913, as follows:

During the month 39 vessels arrived, of which 25 carried vegetable matter and one vessel moulding sand.

Disposal.	Lots.	Parcels.
Passed as free from pests.....	878	22,221
Fumigated . . . . .	15	329
Burned . . . . .	69	87
Total inspected . . . . .	962	22,637

Of these shipments, 22,264 packages came as freight, 174 packages in the U. S. mail and 199 packages as baggage.

### *Rice.*

During the month 32,349 bags of rice arrived from Japan and 500 bags of rice from China. All were found free from infestation and were passed.

### *Pests Intercepted.*

Sixty-two packages of fruit and 25 packages of vegetables were found in the baggage of passengers and immigrants from the Orient, which were seized and destroyed.

In one box of orchids from Manila a species of Thrips, some caterpillars (*Lycaenid* species), three species of ants, several flea beetles, several larvae of a tiger beetle (*Cincindelidae*) and three other species of beetles were found dead in the loose rubbish after fumigation.

Some hibiscus cuttings from Tutuila were infested with the black scale *Saissetia nigra* and *Hemichionaspis minor*.

One lot of chestnuts from Japan was found infested with weevils and destroyed.

### *Hilo Inspection.*

Brother M. Newell reports the arrival of four steamers and two sailing vessels, the former bringing 127 lots and 2783 pack-

ages of fruit and vegetables. One case of soil-covered celery was cleaned and one case of Aphis-infested Kohlrabi was fumigated before delivery. Six tons of moulding sand were passed after careful examination. It is now reported that in June the first direct steamer from Japan will arrive at Hilo. I have given Brother Newell full instructions about rice shipment. He has notified the consignees about infested rice and I do not anticipate any trouble.

### *Inter-Island Inspection.*

During the month of March 58 steamers were attended to and the following shipments were passed:

Plants . . . . .	91 packages
Taro . . . . .	786 bags
Lily root . . . . .	22 packages
Vegetables . . . . .	3 "

Total passed after inspection.... 902

The following packages were refused shipment:

Plants—Rejected on account of soil...	8 packages
Fruit—Prohibited . . . . .	14 "

Total refused shipment.....22 packages

Two boxes of parasite material of the cotton boll worm arrived from India for Mr. D. T. Fullaway of the U. S. Experiment Station and were opened in my presence. This material was forwarded to Mr. Fullaway at my request after consultation with the President of the Board, he having better facilities for caring for the same.

The Japanese beetle is again giving a lot of annoyance and I have inoculated a number of lots which were brought to the laboratory by interested residents. We can do considerable work in this line if people will furnish the beetles, but we have no time to collect beetles for distribution, therefore all who take interest enough to bring in beetles for inoculation will be supplied with them.

Respectfully submitted,

E. M. EHRLHORN,  
Superintendent of Entomology.

There seems to be a general revival of silk culture throughout the tropics. Recently the Madagascar government has taken steps to encourage mulberry growing in that island and the classification of cocoons is to be made a matter of government regulation. The writer has personal knowledge of the excellence of the silk fabrics made by the Madagascar natives. Some very fine specimens of "Malagasy" silks are obtainable in most of the East African ports. This silk seems to be the product of a local caterpillar, probably native to the island.—*Philippine Agricultural Review*.

*ELECTRICAL TAPPING OF RUBBER TREES.*

According to *The India Rubber World* of New York, there appears a possibility of the old system of rubber tapping, which has existed for nobody knows how many centuries, being superseded by a new invention of a German scientist, Mr. George M. von Hassel, who has been employed for many years by the Peruvian Government to explore the resources of its rubber territory. This gentleman, says our contemporary, who is a civil engineer by profession, has devised a method of extracting rubber from the tree which, if not instantaneous, is at least rapid and efficacious in its operation, and if it works out in practice as it has given promise of doing in the various tests to which the process has been subjected, it may probably be adopted. Here, briefly, is the apparatus that he has devised: He places upon the trunk of the rubber tree a piece of sheet iron about five feet long, five inches wide, with the two sides folded back against the tree to a thickness of about two inches, constituting a hollow channel of sheet iron. This hollow channel is divided into a series of fifteen to thirty sections; the number of sections depends upon the number of days the apparatus shall be worked. Each section has a mechanism for the extraction of the latex from the rubber tree and a receptacle for receiving the flow, which also contains a preparation for the coagulation of the latex. When working *Hancornia* and *Castilloa* trees, plates provided with longitudinal canals are used instead of the receptacles for gathering the latex, and the product thus obtained is known as "Sernamby." This product is gained in the form of threads without the aid of acids or other chemical substances.

The method of operating is as follows: This channel of sheet iron, with the above described mechanism and receptacles, is fastened against the rubber trees. If it is a small tree there will be two of these devices; if it is a large tree, there may be as many as nine circling the tree and about a hand span apart. This apparatus is connected by an insulated wire with a central station which is equipped with electric power. A machine devised by the inventor makes it possible to send the electric current so that it will set the first section in motion. The latex then oozes out and flows into the receptacle immediately beneath. In the receptacle there is an acid preparation that coagulates the latex, converting it into rubber. The next day or preferably forty-eight hours later, the current is turned on again affecting the second section, which in turn pricks the tree, bringing forth the latex, which drips into the second cup and is there similarly coagulated. After another interval of two days, the third section is set in motion, and so on for the fifteen to thirty sections, which are operated from the central station, tapping the tree and filling the receptacles with rubber. It is not necessary to examine the tree until the expiration of sixty days, when a handful of rubber will

be found in each of the receptacles, and on a large tree when there are none of these devices—each with thirty cups—there will be 270 lumps of coagulated rubber waiting for the gatherer. It is stated that the same current that does the work on one tree can do the work on 5000 trees by simply equipping that number of trees and connecting by the insulated wire, so that the electric current can be communicated. In an actual test already made, between fifty and sixty trees have been tapped at one time from the central station.

According to Mr. von Hassel, the advantages are as follows: First, the enormous saving of labor, one man being able to do the work of forty under the old system; secondly, the power to tap trees in the swamps which cannot often be approached by the tapper; third, the fact that the trees can by this process be tapped very early in the morning before the sun is up, when the latex flows more freely; and, fourth, the fact that the trees cannot be injured by this process, as the punctures are very small and heal rapidly.—*H. and C. Mail*.

### POPULARITY OF BANANA FOOD PRODUCTS.

BY O. W. BARRETT, in *Philippine Agricultural Review*.

After a decade or more of partially successful experiments in the manufacture and popularization of banana products, a definite market is now assured, at least in Europe, and we may expect to hear of numerous factories being established throughout tropical America and, let us hope, even in the Philippines, within the next few years.

Jamaica, in the West Indies, has been the mother, so to speak, of this industry and it is in that island where nearly all of the really important factories for handling bananas are now to be found. In the March, 1912, number of *The Philippine Agricultural Review* attention was called to the appearance on the market of several varieties of banana products; it seems, however, that recently several additional companies have entered into the business in Jamaica. From the Daily Consular and Trade Reports we learn that at least six factories are now in operation and two other companies are contemplating the erection of large plants.

The following quotation taken from the above-mentioned publication indicates clearly the present status of the business; the processes in use in the various concerns are, of course, more or less private, though for that matter Philippine conditions would necessitate the working out of special methods for handling the material here:

"The original factory, which has been operating about six years at Gayle, claims to have a secret process for making banana figs. A large factory at Montego Bay had its machinery made after

its own designs in New York. Two other companies expect to patent their machines, which have been locally designed and manufactured. It is understood that the drying is done by hot air and that it takes 400 to 500 pounds of fruit to make 100 pounds of the figs. For a good many years experiments have been made in drying bananas, but it has been difficult to find a process for making a product that would keep well. Now that manufacturers are using a variety of machines and apparatus it is to be expected that the best process will soon be known. Although worms are never found in ripe bananas, the preserved fruit, if left exposed, attracts insects and soon becomes infested with small worms, as is the case also with other dried fruits.

"The food products manufactured are fig bananas or banana figs, cooking bananas, banana chips, flour, and meal. All the factories dry or evaporate the bananas whole without the addition of sugar, and yet they are sweet and palatable, like pressed figs, which they also resemble in color. At least one factory cuts the bananas into short pieces before drying or evaporating them, thus making a product that looks much like the dried figs of commerce. It seems that it would be well in order to make a distinction to call the bananas cut into pieces 'banana figs' and those treated whole 'fig bananas.' What are known as 'cooking bananas' are so thoroughly dried as to be hard, the color of these being almost white. Broken into pieces they form 'banana chips,' which not meeting with duties are imported to be ground into meal or flour in the country of consumption. In spite of the fact that the meal is said not to keep well, one Jamaica factory uses an American gristmill for grinding the chips. Another company has its own factory in London, to which it exports the chips to be ground into flour and meal and made into other preparations for market. A small booklet is issued there to set forth the dietetic value of banana foods as attested by British and German food experts and others; and there is added a list of products on sale, with recipes for their use, etc. These banana food products have been awarded many prizes, diplomas, and certificates of merit.

"It seems that all banana food products are wholesome and nutritious. The figs are delicious and are likely to be preferred to real figs by many persons. The fig bananas cut into small pieces may be used like raisins to impart an additional flavor to cakes and puddings. The chips, after being well pounded or ground in a coffee or other hand mill, may be boiled and then used as an excellent breakfast food or for making delicious puddings. Gruel, porridge, and other preparations made from banana flour and meal, which are rich in easily soluble carbohydrates, are recommended for infants, invalids, and dyspeptics. The negro women of Jamaica use banana meal gruel as a substitute for milk for their infant children. The banana itself is one of the most wholesome and nutritious of fruits if eaten slowly when it is perfectly ripe (that is, just before it decays), but not when devoured only

half ripe, as is often the case in the United States, which causes many persons to regard bananas as being difficult to digest.

"It seems only necessary to make the value of banana food products known in order to create a large market for them. Already they are to a considerable extent popular in Germany and Great Britain, which have been taking the bulk of the exports of such products from Jamaica. \* The Hawaiian Islands and the Philippines also seem to offer inviting fields for the profitable manufacture and exportation of banana food products."

An interesting feature in the comparative progressiveness of Europe and America in the line of adopting new foods, etc., is brought out in the statement that a large United States order was recently refused by one of the Jamaica companies by reason that it was under contract for shipment to Europe of practically its entire output. It seems that the combined capacity of the Jamaica factories is only some three tons per day, but this will probably be considerably increased in the near future.

The writer remembers with pleasure testing both at Key West, Florida, and Washington, D. C., a series of samples of banana products made by a Central American firm; moreover, he made numerous experiments (extending even to table tests) at the Porto Rican Experiment Station in the line of flours, meals, and coffees, from numerous varieties of bananas and plantains grown in that island; in Porto Rico, however, the only form of banana food in general use aside from the fresh fruits is a plantain flour from which a most wholesome gruel for invalids is prepared.

In short, then, we should remember that banana products can be very cheaply grown in the Philippines; that these foods may be very conveniently and safely stored, transported, and exported; that they are of very high nutritive value; and therefore that they can not be overlooked in any study of the social economics of these Islands. In short, the banana as a crop not only helps out very materially the precarious old one-crop system but also provides a very interesting subject for study by the future manufacturers and merchants in the Orient.

### *THE DANGER OF INFECTION FROM TUBERCULOUS MILK.*

Medical men and veterinarians have for many years been in accord in urging the necessity for the adoption of strong measures to keep in check, and eventually get rid of, the plague of tuberculosis; and a paper read by Dr. Sheridan Delépine a short time ago, at the conference of the National Association for the Prevention of Consumption, can well be brought to the notice of our readers in the same column as the recently issued report (for 1911) of the veterinary surgeon of the Corporation of Glasgow.

Dr. Delepine took as the title of his paper, "The Share Taken by Human and Bovine Tuberculous Products in the Infection of Young Children," and his final statement demonstrates very emphatically the necessity for the systematic and proper inspection of dairy cattle, for he states at the conclusion of his paper, "Taking all these things into consideration, I think it is possible to say, without fear of exaggeration, that not less than 25 per cent. of the tuberculous children under 5 years of age suffer from infection of bovine origin, and that this estimate is much lower than one based on probabilities would be." Earlier in his paper we read the gratifying statement that "as a result of the work done in Manchester during the last fourteen years the amount of tuberculous milk supplied to the town has been reduced to about one-third of what it was originally, and its infectivity has also been reduced to a very considerable degree." This statement is a great tribute to the work done by Dr. J. Niven and his veterinary officials, and the example of the Manchester Corporation in this direction might with advantage be followed by other cities, if parliament is still going to delay some form of general legislation on milk questions, and leave municipalities to use what local powers they can obtain in various manners. The extensive prevalence of tuberculosis in cattle and in that other animal, the pig, which feeds so largely during a certain portion of its life upon milk, is constantly brought into prominence by abattoir statistics, and those of Glasgow carefully compiled in the veterinary report of Mr. Trotter show no exception to the rule. Mr. Trotter commences his report by the statement that "The most frequent disease affecting home animals is tuberculosis," and states that out of 71,745 British cattle slaughtered no less than 8932, or 12.44 per cent., proved to be tuberculous. Of these, 1398, or 15.65 per cent., of the carcasses were so badly affected that they had to be destroyed. Of the pigs, out of 44,643 animals slaughtered, 3740, or 8.37 per cent., were tuberculous, 91, or 2.32 per cent. of the carcasses, having to be totally destroyed. He calls attention to the crying necessity for enforced legislation in connection with the inspection of dairy cows and the sale of milk, and states that a comparison of the number of cows in Scotland with the number of cows removed under the order shows that, whilst a few authorities are doing their utmost to prevent the sale of milk drawn from animals affected with tuberculosis of the udder, there are a great many other authorities who are doing absolutely nothing. He points out how defective the "milk" clauses of the Burgh Police Act are in that they "do not compel the dairyman to notify all cases of udder disease, do not insist upon the examination of all cows being carried out by veterinary surgeons, and do not empower the local authority to slaughter useless animals." Of the prevalence of tuberculosis amongst milch cattle, further evidence was shown by the fact that of ninety-eight cows tested with tuberculin before being admitted to the herds from which



milk is supplied to the fever hospitals no less than forty were rejected, thirty of them being positive and the other ten doubtful reactions—truly an alarming proportion when we consider that these would all be good-looking beasts which had received the critical attention of the dairy owner beforehand in the full knowledge that they were to be tested. The danger is not, of course, that all the reacting animals give infective milk, but that such a degree of prevalence of tuberculosis must mean the presence of a high proportion of dangerously infected animals in our herds. It is now five years since the Commission on Tuberculosis reported that "cows' milk containing bovine tubercle bacilli is clearly a cause of tuberculosis, and of fatal tuberculosis, in man." Neither the Board of Agriculture nor the Local Government Board has been sufficiently active in the matter, but we note with pleasure that Mr. John Burns has given notice of the introduction of a new milk bill into the House of Commons.—*The Lancet*.

#### *MEDICINAL AND OTHER PROPERTIES OF THE PAPAW (PAPAYA).*

The milky juice of the unripe fruit of the papaw tree is admitted by high medical authorities to be an efficient vermifuge, and a similar property is possessed by the seeds, which have a pleasant flavor resembling that of cress. The juice is also a good cosmetic, which is used for the removal of freckles. But the most remarkable thing connected with the papaw tree is property possessed by the milky juice of the unripe fruit of separating the fibers of flesh and making it tender. The late L. A. Bernays, who was undoubtedly a reliable authority on the properties of plants and fruits, says, in his valuable work on "The Cultural Industries of Queensland," that this property is not confined to the juice of the fruit, but the very exhalations of the tree are said to possess it; and of this fact the Brazilian butchers take advantage to make their toughest meat saleable. This is accomplished by suspending the newly-killed meat in the tree, or by wrapping it in the leaves. So powerful is this softening action of the juice that it must be used with caution, or the meat will drop to pieces, which makes it more unpalatable than if left in its original condition of toughness.

Some interesting experiments were made some years ago upon this subject at the Royal Agricultural Museum, Berlin. A portion of the juice was dissolved in three times its weight of water, and this was placed with 15 lb. of quite fresh, lean beef in one piece in distilled water, and boiled for 5 minutes. Below the boiling point, the meat fell into several pieces, and at the close of the experiment it had separated into coarse shreds. The juice can be dried without losing its effect, but its efficiency in this respect does not appear to have been tested over a longer period

than six months. For roasting or baking, the best method is to wrap the meat in some of the leaves; and for boiling, to add to the water some of the expressed juice or a piece of unripe fruit. The exact proportion to be used, and the time to be employed to render meat tender without softening it too much, can only be learned by experience; but in a hot country, where meat is necessarily cooked so soon after killing, a method by which it may with certainty be served tender, without detriment to its flavor or wholesomeness, is worth taking some trouble to determine. There can be no doubt concerning this property of the papaw juice and leaves, for we have frequently rubbed tough beefsteak with the milk of the unripe fruit with the result that the meat could be pulled to pieces with a fork on the following morning. The milk has a remarkable effect in eradicating corns and warts. A decoction of the leaves is a wholesome medicine in internal fevers. The dried leaves mixed and smoked with tobacco, or alone, afford great relief in cases of asthma. For dysentery the ripe fruit is a sovereign remedy.—*Tropical Agriculturist*.

### HOW TO MAKE A SCHOOL GARDEN.

The following interesting article contributed by Mr. C. A. Barber to the "Madras Agricultural Calendar," is reproduced in *The Journal of the Board of Agriculture of British Guiana*. Every elementary school should have its garden. It is, of course, important for children to learn to read and write and to do simple sums, but other things are necessary to equip them for life, especially in those cases where the mass of the population is devoted to agriculture. They must be taught to observe; not only to see things, but to understand what they see. The school garden, if properly managed, is one of the best means of training children in this way. There is yet another way in which the school garden may be useful. If the children are taught to do work themselves, they will be taught to do things, not merely to know how to do them. The school garden, then, may be used to train children in observing, in reasoning, and in the capacity for doing things for themselves, all very important matters in after life. They can also be taught to be neat and methodical by making them keep the place neat and tidy.

The main line of work should be to learn all about the way plants grow. Plants should be reared and examined at all stages from the bursting seed to the flowering and fruiting stages. The sowing of seeds in pans should be taught, with the necessary protection against the sun, wind and rain. The seedlings when very tiny should be pricked out into smooth beds so as to leave just room for them to expand and make a few leaves. Then they should be lifted, each with a ball of earth around its roots, and

put into the place for which they are intended. Beds should be formed with good gravelled paths between. The beds should not be too wide; every plant should be easily reached from a path, because all treading on the beds should be carefully avoided. Flowers want a good deal of sun, but foliage plants will require some sort of shade. Shrubs should be planted round the outer part of the garden or here and there in the middle if there is plenty of room. Trees should be kept outside as much as possible, for their roots interfere with the beds. By this means you will have the brightly colored flowers in the middle open space, foliage plants nearer the edges, and shrubs and trees forming the background. If possible a small patch of grass lawn should be added to set off the flowers, but it must be kept free from all weeds.

A careful plan of the garden must be made showing all its paths and beds, and this should be filled up with the plants growing in it every season. The children should be made to take part in every kind of planting. They should be taught to weed the beds and keep the paths clean. All weeds and leaves, loppings from the trees and garden rubbish should be put into a pit in a hidden corner with a layer of earth spread over every now and then. This weed pit is a most useful adjunct to a garden and when the weeds are well rotted and their seeds destroyed, the leaf-mould obtained from it may be useful for potting plants or in improving the soil.

As great a variety of plants as possible should be aimed at; for each will show something of interest and the children will learn something of the infinite variety of Nature. The teacher will find it much easier, where there are many kinds of plants growing, to select just those for class work which are suited to the lesson of the day. By a well-arranged school garden every part of a plant's life may be illustrated, the use of each organ, the causes of health and disease, animal and vegetable pests (which will always be present), the effect of the sun and light, wind and shade, watering and drought.

### *FERTILIZATION OF TROPICAL CROPS.*

Tropical Life (London) for March, in an article on the fertilization of tropical crops, pays a high compliment to the advancement of the Hawaiian sugar industry in that respect. It may serve the purpose of emphasizing the example of our sugar planters for the benefit of Hawaiian small farmers and homesteaders to quote some of the remarks of the English periodical. At the beginning the article says:

"It is probably not realized, even by those who are directly

concerned, how little real attention is devoted to this all-important question.

"In temperate climates the interest in the subject is increasing by leaps and bounds as the ever-growing demand for food-stuffs makes it imperative that the soil should be made to produce to its utmost capacity."

Pointing out that the future supply of food for the world's consumption will soon become a pressing one, as population increases and new fields for cultivation become fewer and fewer, the article proceeds in part as follows:

"In tropical countries, with a few exceptions such as Java, Ceylon and Hawaii, the importance of getting the maximum yield from the soil does not seem to be realized, or, if it is, little attempt is made towards accomplishing it. It is almost impossible to calculate the annual loss to the cultivator, and therefore to the whole community, which arises from either ignorance of fertilizing methods or careless disregard of them.

"Take the case of India, or of Mexico, or the coffee lands of Brazil and the Central American States. It would be safe to say that the crops generally could be doubled and even trebled in those countries, on the area now under cultivation.

"In India, where the Government is now devoting much time and money towards the improvement of agriculture, nearly one million tons of sugar have to be imported yearly. And yet probably over two million tons are produced in the country. It is said that the average yield of sugar per acre in India is less than half a ton, while the average is not much better in Cuba, where also some two million tons of sugar are produced per annum. Compare this with the average yield in the Sandwich Islands, where the utmost care is given to the question of fertilizing, with the result that an average yield of nearly five tons of sugar per acre is secured. Quite apart from good management and cultivation, which may do much, it is admitted that this splendid result is mainly due to carefully thought out fertilization. And it must be remembered that similar results are obtained, not in one year only but every year, by systematically replacing the plant foods which are removed by the crop. Making all allowances for any climatic advantages Hawaii may possess, there is surely no reason why India and Cuba should not at least double their sugar production on the land at present under cane. Even so, the yield would only be one-fifth of that of the Sandwich Islands.

"The sugar crop is only taken as an example because of the extraordinary difference in yield shown between a highly fertilized crop, as in Hawaii, and the practically unfertilized crops in India and Cuba. The position is much the same with all crops in the tropics. The wheat crop is, perhaps, the most

important, and there is no question that much of the immediate anxiety about the world's food supply would be allayed if the vast area under wheat in tropical and sub-tropical countries were so treated as to produce something approaching its real capacity.

"The problem is not an easy one, for in many cases the supply of pen manure is nothing like sufficient for the needs of the crop, and it may be thought that the cost of artificials would often be such as to prohibit their use, at any rate with profit to the grower. As a matter of fact, this would not be the case, except in isolated instances, and the grower must be taught the value of these (so-called) artificial plant foods. There are but few places in the world in these days where a demand for such commodities would not be met with a supply. The difficulty is that the grower—be he European or native—is, as a rule, reluctant to make an outlay on manures; and it is only after months, sometimes years of patient instruction and demonstration, that the expert's teaching bears fruit.

"We have observed with much interest the great strides made in Egypt in this direction during the past few years, as evidenced by the largely increased imports of phosphatic and nitrogenous fertilizers since 1908. In that year, for instance, the import of nitrate of soda was 15,000 tons, while in 1912 the figures had risen to over 56,000 tons. This only shows what can be done, even with the conservative native cultivators, if only practical steps are taken to educate them; and though the way may sometimes be long and the difficulties great, we have proof in these figures that the thing is not only possible, but can be successfully accomplished."

### COMMERCIAL BIRD BREEDING.

Readers of the Forester are aware that the Board of Agriculture and Forestry has given much attention, in recent years, to the question of the importation of birds to these islands which might be assured to be beneficial with respect to their selection of insect and grub pests for food, and not liable to change their habits so as themselves to become nuisances—which would be nothing new. Lately the question of the introduction of strange birds has become a popular topic of discussion, in connection with the arrival of a bird fancier from Australia with a considerable stock of members of curious feathered tribes, together with the fact that the municipality of Honolulu has a special fund, from hunting

license fees, for the purchase of game birds to turn loose in field and wood.

In view of these things, it will be interesting to give some account of a controversy, or at least a discussion from opposite view-points, now going on in England between traders in plumage and those who are anxious to save from extermination the many beautiful feathered creatures that are killed for the sake of their plumage. Of course, no one here is directly interested on either side of the contest, but, in the matter of diversified industries, there is an attractive phase of the matter to local people in the suggestion of solving the problem through the breeding of birds valuable for their plumage, especially as a few people here have gone into the raising of foreign varieties of pheasants and other fancy bird stock.

Two joint correspondents of *Tropical Life*, in the March number of that magazine, refer to efforts being made by the bird protectionists to induce the British government to prohibit absolutely the importation into the United Kingdom of the plumage of practically all birds save that of the ostrich and those of which the flesh is eaten as food. They say:

"So far as we can see there is not the slightest chance that any bill prohibiting the import of plumage will become law. Even if such an act were placed on the Statute book, the benefit to the birds would be small unless either similar enactments were passed in all European countries and in the United States of America or laws were passed prohibiting the export of plumage from the various tropical and sub-tropical countries in which the feather-yielding birds occur. Those who have followed the controversy know well that there is not the least likelihood of the other European countries passing acts prohibiting the import of plumage."

## *TROPICAL AGRICULTURAL UNIVERSITY.*

Mention has been made in previous numbers of the *Forester* regarding an agitation throughout British tropical dominions for the establishment of a tropical agricultural university. Both the agricultural press of London and of colonies wide apart have been discussing the subject for some years past. The *Forester*, on different occasions, has put forth the suggestion that the College of Hawaii should be advertised in British tropical countries and their motherland as an institution possessing at least the basic conditions which it is urged a tropical university should have. It has the nucleus of an efficient faculty, abundant material for purposes of teaching and study, the right environment—while in location it offers perhaps as moderate a cost of maintenance in

civilized associations to students as any other place equally suitable in technical requirements.

The following extracts from an article in the *Agricultural News*, a journal that often of late has agitated the question, at once describes what the British tropical agriculturists are wanting and what the College of Hawaii is now fairly ready to offer in the way of teaching of tropical agriculture, both in the abstract and the concrete:

"All the West Indian colonies now possess local departments of agriculture with their experiment stations; there is little prospect, however, of these becoming so equipped as to warrant their undertaking abstract investigations in agricultural subjects; their functions are likely to be limited more or less to problems of a concrete and more immediately practical character. A university of tropical agriculture would tend to strengthen and develop the work of the local agricultural departments, and could in no sense be regarded as displacing them or reducing their work and activities, for it could undertake useful investigations of a more abstract character than are appropriate to experiment stations—so that there would arise a useful distribution of work of investigation and coöperation between existing institutions and the one now contemplated.

"As an outcome of its centralizing influence a tropical university would play an important part in acting as a means for accumulating and storing knowledge relating to tropical agriculture ready to be drawn upon by workers in its neighborhood and even over a wider range; it would also serve as a centre where knowledge and ideas would be grouped and coördinated so as to permit of the production of well considered views relating to various industries—an idea which found expression in the letter addressed to *The Times* by Mr. John W. McConnell in which he pointed out how such an institution might materially advance the interests of cotton-growing by assisting to formulate knowledge for the guidance of those who are endeavoring to push cotton-growing into new districts; and we may add it would serve to train men who would be qualified to carry these ideas into practice after having acquired experience in their application. The same ideas may be employed in regard to many other industries than cotton: cacao, rubber, oils, fruits, spices, and many others present their special unsolved problems which await the students and investigators who, it is reasonable to conceive, would soon group themselves around a tropical university."

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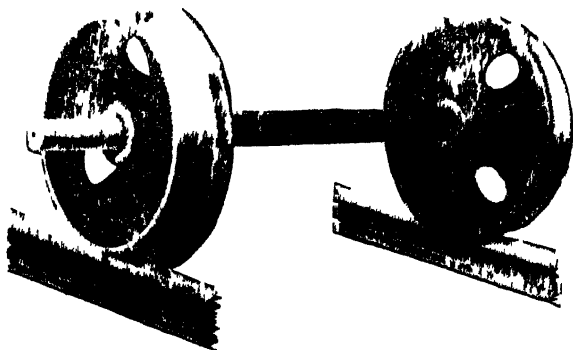
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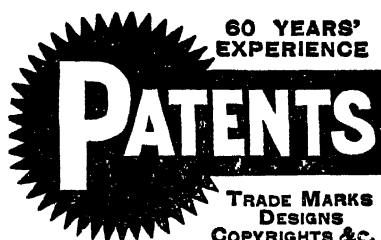
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# THE HAWAIIAN FORESTER & AGRICULTURIST

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## FERTILIZATION OF TROPICAL CROPS.

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"In temperate climes the interest taken in the subject is increasing by leaps and bounds as the ever-growing demand for food-stuffs makes it imperative that the soil should be made to produce to its utmost capacity."

Pointing out that the future supply of food for the world's consumption will soon become a pressing one, as population increases and new fields for cultivation become fewer and fewer, the article proceeds in part as follows:

"In tropical countries, with a few exceptions such as Java, Ceylon and Hawaii, the importance of getting the maximum yield from the soil does not seem to be realized, or, if it is, little attempt is made towards accomplishing it. It is almost impossible to calculate the annual loss to the cultivator, and therefore to the whole community, which arises from either ignorance of fertilizing methods or careless disregard of them.

"Take the case of India, or of Mexico, or the coffee lands of Brazil and the Central American States. It would be safe to say that the crops generally could be doubled and even trebled in those countries, on the area now under cultivation.

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also some two million tons of sugar are produced per annum. Compare this with the average yield in the Sandwich Islands, where the utmost care is given to the question of fertilizing, with the result that an average yield of nearly five tons of sugar per acre is secured. Quite apart from good management and cultivation, which may do much, it is admitted that this splendid result is mainly due to carefully thought out fertilization. And it must be remembered that similar results are obtained, not in one year only but every year, by systematically replacing the plant foods which are removed by the crop. Making all allowances for any climatic advantages Hawaii may possess, there is surely no reason why India and Cuba should not at least double their sugar production on the land at present under cane. Even so, the yield would only be one-fifth of that of the Sandwich Islands.

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## COMMERCIAL BIRD-BREEDING.

(For the beginning of this article, see the April number. What follows here was inadvertently cut off without a continuation line.)

To meet the difficulties of the problem the correspondents advocate bird-farming, also a commission to take evidence with a view to ascertaining the extent to which the trade in the skins and feathers of birds may be carried on consistently with the maintaining of the numbers of the birds affected. As to regulation and breeding they present the following arguments:

"In the case of such polygamous birds as the monal or Impeyan pheasant (*Lophophorus refulgens*) it is well known that a judicious thinning out of the cocks is beneficial to the species, because the unmated cocks worry the hens and interfere with their breeding arrangements. As the trade require only the skins of the cocks it is obvious that numbers of these can be supplied in places where the birds are numerous without reducing the numbers of the birds.

"This is not mere conjecture. The experiment has been tried and has proved successful. Moreover, pea-fowl and the various pheasants can be farmed. Pea-chicks are reared in the Zoological Gardens at Lahore by hatching the eggs in an incubator and giving over the young birds to the care of the barndoor hen.

"An enormous trade is carried on in the nuptial plumes of some species of egret. These plumes are known in commerce as 'ospreys.' There is no reason of which we are aware why egret farming should not prove as profitable as ostrich farming.

"Moreover, since Egrets nest in large colonies it should be possible, with proper management, to remove the nuptial plumes from wild birds without harming them. Some of the birds of which the plumage is largely imported, notably the Indian paroquets (*Palaeornis*), are very destructive to the cereal crops. In some parts of India these paroquets are so numerous as to be a scourge to the cultivator. In such localities the paroquets might, with advantage, be judiciously weeded out."

The correspondents mention that the government of France last March stated that it had no intention of prohibiting the import of plumage into that country, "because such a prohibition would have the effect of causing very great loss to an industry which supports a French working-class population of at least 50,000 persons and involves a turnover of more

than 100 million francs. It is equally certain that export will not be prohibited from the countries whence the feathers come." Referring to the prohibition of the export of plumage from India, the writers say that it is to a large extent nugatory on account of the ease with which egret can be smuggled. "Thus the birds are being slowly but surely exterminated," say the writers, "while the traders and protectionists are fighting one another. This is coming to pass in spite of the fact that both sides are, or ought to be, anxious to prevent the extermination of the birds."

Harold Hamel Smith, editor of *Tropical Life*, prints a reply he had sent to the correspondents above quoted. He states that in an Anglo-tropical journal "a section specially devoted to economic zoology is striving to show how important bird-breeding industries can be established in tropical and other centers, at many of which the climatic conditions would allow of their being carried on by English families. Such establishments could breed the different varieties of egrets, pheasants, game birds, ducks, pea-fowl, and many other birds, not only to ship the plumes of varieties now known to ornithologists and the trade, but by careful and scientific cross-breeding and 'Luther Burbanking' the birds, to evolve new colors and effects, so as to feed our trade novelties at present unknown, and so cause the fashions to change for more often than they have done of late, thereby giving each particular strain time to recover. Many of these crosses would probably not breed; so far from reducing the birds, the trade would alone be the means of increasing the numbers and varieties. I am told some striking effects have already been obtained by crossing Javanese and Indian pea-fowl, as can be seen in the section devoted to hybrid at the Natural History Museum, South Kensington; also by such crosses as the Golden and Lady Amherst pheasants. In this case the hybrid, being fertile, can be propagated to any extent, instead of having to be rebred each time.

"At the end of September I went specially over to Paris to make inquiries into the matter, and, with M. Amédée, son of the founder of the *Revue Britannique*, visited the Jardin d'Acclimatation to see the birds and animals there and to discuss the subject of cross-breeding birds. Of the animals, I was principally concerned with the guanaco, llama, and vicunas, some of which seem likely to become dangerously scarce unless prompt attention be given to their preservation, in which case I believe important industries could be established. Since my return I have written an article on the guanaco, which is shortly to be published. I wonder how many of the opponents of the bird-millinery trade have troubled themselves about this animal.

"With what I have learnt in Paris and London, coupled with

my own (now nearly thirty years) experience of the tropics and its birds, I am certain that if it is *only* extermination that is feared, the whole controversy can be ended, and both sides brought together to prevent this, in a very short time. I therefore appeal through your columns to the head of the India office and to the secretary of state for the colonies, and others who believe in keeping this important trade for England, especially London—once there is no fear of the birds being exterminated or becoming even scarce—to bring about a meeting, without including the ultra-humanitarians and the faddists (who have already had more than their share of attention), to hear what practical men, and those who have had long experience in the matter, have to say."

### 1 FENCE POST TEST.

The following letter to the Superintendent of Forestry, which explains itself, is believed to be of sufficient general interest to make it worthy of being put on record. The posts were cut from trees grown in the Tantalus forest, felled during the winter of 1910. They were allowed to season by air drying for several months prior to their being put in the ground. Further examinations of these posts, in later years, should yield additional information as to the lasting qualities of this wood.

The College of Hawaii, Honolulu, Hawaii, April 26, 1913.  
Mr. Ralph S. Hosmer, Superintendent of Forestry, Board of Agriculture and Forestry, Honolulu.

Dear Mr. Hosmer:—Complying with your recent verbal request for a report on the condition of the *Eucalyptus cornuta* fence posts which are under test at the College Farm in Manoa, I beg to report on same as follows:

Charred Posts—Average decay 6 inches to 12 inches below surface of ground,  $\frac{1}{4}$  inch to  $\frac{1}{2}$  inch.

Tarred Posts—Average decay 6 inches to 12 inches below surface of ground, 0 inch to  $\frac{1}{4}$  inch.

Creosoted Posts—Average decay 6 inches to 12 inches below surface of ground, no decay.

Posts Set in Concrete (not treated)—Average decay 6 inches to 12 inches below surface of ground,  $\frac{1}{2}$  inch to 1 inch.

Untreated posts—Average decay 6 inches to 12 inches below surface of ground,  $\frac{1}{4}$  inch to  $\frac{3}{4}$  inch.

From the above it will be noted that the creosoted posts were found to be in the best state of preservation. The second best preserved posts were those that were tarred. The charred posts showed about the same amount of decay as the untreated posts, so that it is assumed that the charring had but little or no value as a preservative.

The posts set in concrete showed by far the greatest amount

of decay. In fact, to the depth of a half inch or more the decayed matter was quite soggy, and in one case a luxuriant fungus growth appeared at the surface of the ground where the concrete began.

It is quite plain that the concrete tends to hold moisture at the surface of the post, thus hastening decay. From this experiment, which is now under way two years, it is plain that the creosoting and tarring of the posts are the only treatments worth considering, and of these two I would recommend creosoting as the best and most practical.

In every case the greatest amount of decay was noted where posts were set in wet ground, as was, of course, to be expected. Where posts were surrounded by stone which permitted the moisture to dissipate freely, all posts of whatever treatment were in a fair state of preservation.

All of the posts reported upon in the above had their bark removed before setting. This practice is to be highly recommended. Posts not so treated were more or less affected by borers and presented a bad appearance generally.

It was further noted that wherever the posts checked badly, especially at the top, the work of borers was active. I would suggest that it might be a good plan to dip the ends of all posts in tar to prevent excessive checking.

The cost of dipping the posts three feet in creosote was about 12½c each; the cost of dipping in hot tar is a little less, say about 10c.

The cost of peeling off the bark when posts are green is about 5c each.

Trusting that these data may be of some practical value, I am,

Very truly yours,

F. G. KRAUSS,  
Professor of Agronomy.

### *NEXT RUBBER EXHIBITION.*

In this number will be found an article from the Rubber World Supplement on the international rubber exhibition in London in 1914, for which, with other data on the subject, the Forester is indebted to Mr. Wilbur A. Anderson, secretary of the Hawaiian Rubber Growers' Association. Mr. Anderson is a member of the advisory committee of the London exhibition, of which King George is patron and Sir Henry A. Blake, G. C. M. G., president. Medals are offered for the best Ceara rubber, the best sisal hemp and the best Robusta coffee, all of which might have an interest for Hawaii. In forwarding the material referred to, Mr. Anderson, writing on May 2, says:

"Allow me to express my appreciation of your editorial in the last Forester concerning the 1914 Rubber and Tropical Products Exposition. I heartily agree with your views concerning the wisdom of the Territory doing something to help the smaller agricultural enterprises in making a creditable exhibit. It would seem that, with the present hard outlook for sugar, it behooves us, besides complaining of our hardships in this line, to make even more strenuous efforts than ever before to establish our minor industries, and to consider the possibilities that might lie in substituting some of these other crops for sugar on the poorer sugar plantations, which must inevitably give up raising sugar, if the worst we fear should come.

"I presume, in view of the hard times anticipated, and the expense of the Panama Exposition, we can hardly expect the present legislature to adopt your suggestion, but you have given them the opportunity, anyway, and your part is done."

An article reproduced elsewhere from *Tropical Life* for April, on the subject of coconut estates and army remounts, under the department head of "Economic Zoölogy," contains matter that might be worthy of study in Hawaii.

Interesting matter on dry farming in the tropics, contained in a book review, appears in this number.

### *THE VARIATION IN THE QUALITY OF RICE.*

By C. K. McCLELLAND.

Before taking up directly the factors causing variation in the quality of rice it may be well to review some of the experimental work relating to the influence of various factors upon the quality of grains in general. Primarily by a difference in quality, we mean a difference in the chemical composition. In some grains a difference in composition may be easily detected by the eye. In corn, for example, the practiced eye can tell the variations in the content of oil, carbohydrates, or protein. In wheat, the differences are not so strongly marked, but it is easy to distinguish between the hard, glutenous wheats and the soft, starchy ones. More experimental work has been done upon wheat than upon other grains and the results show that various conditions of environments are the main factors causing variation.

It has been found that:

1. There is a difference in varieties in their composition. However, the composition of the seed does not always determine that of the product, since other factors may overrule the varietal.
2. The application of fertilizing ingredients to the soil slightly increases the per cent. of those ingredients in the crop.



3. A higher protein content is obtained when plants are grown in the shade than when in the light.
4. Ditto, when there has been a limited amount of water.
5. Ditto, when the growing period is short, than when it is long.
6. Ditto, when there is a high temperature at the time of maturing.
7. Ditto, when the season of ripening following the blooming has been short—this factor being dependent upon the variety, the supply of moisture and the temperature.

With sugar beets it has been found possible to greatly increase the sugar content by selection. In corn also the content of fat, carbohydrates or of protein has been increased by selection along the proper lines. With wheat, selection has not been so uniformly successful, since climatic factors have been found to influence the composition more than all other factors combined.

In Bulletin 128 of the Bureau of Chemistry of the Department of Agriculture we learn—

That Crimean wheat grown in Kansas in 1905 had.....	16.22%	of protein
When grown in Kansas in 1906 from Kansas seed.....	19.13%	of protein
When grown in Kansas in 1907 from Kansas seed.....	22.23%	of protein
When grown in Kansas in 1907 from California seed....	22.23%	of protein
When grown in Kansas in 1907 from Texas seed.....	22.81%	of protein
When grown in Kansas in 1908 from Kansas seed.....	14.70%	of protein
When grown in Kansas in 1908 from Texas seed.....	14.77%	of protein
When grown in California, 1906, from Kansas seed.....	10.38%	of protein
When grown in California, 1907, from Kansas seed.....	11.00%	of protein
When grown in California, 1907, from California seed....	11.33%	of protein
When grown in California, 1907, from Texas seed.....	11.37%	of protein
When grown in California, 1908, from Kansas seed.....	11.52%	of protein
When grown in California, 1908, from California seed....	11.75%	of protein
When grown in California, 1908, from Texas seed.....	12.44%	of protein
When grown in California, 1909, from Kansas seed.....	12.11%	of protein
When grown in California, 1909, from California seed....	13.27%	of protein
When grown in California, 1909, from California seed.....		

By comparing the results in Kansas and California and remembering that the seed used in any one year was that produced in the year preceding, it will be seen that the composition of the seed used seemed to affect the resulting crop not at all; that seed rich or poor in protein when planted in Kansas produced, in any one season, grain of equal quality, but always richer than when the same seed was planted in California.

Also, it will be noticed that there was a variation in the composition in a given place, upon the same soil in different seasons.

The variation in Kansas was from 16.22 to 22 per cent., while in California the range was from 10.38 to 13.27 per cent.

Great variation was shown also in the weight of 1000 grains and in weight per bushel. California Crimean wheat with 64 per cent. of starchy grains, when grown in Kansas produced 100 per cent. flinty. The California experiment station then took the next step, and to eliminate the effect of climate, brought soil from Kansas to California; seed produced upon this soil was also brought along to use in the experiment. Turkey Red Wheat, a hard winter wheat, as grown in Kansas in 1907 had 20.06 per cent. of protein. When grown in California—

On Kansas soil in 1908 it had.....	18.02%	of protein
On California soil in 1908 it had.....	18.29%	of protein
On California soil in 1909 it had.....	15.07%	of protein
On Kansas soil in 1909 it had.....	14.32%	of protein

The results show that when placed under the California climate, the Kansas soil had absolutely no effect upon the protein content of the crop, which was a further proof to that already obtained in Kansas in different seasons. This high protein wheat lost in protein content when grown in California, and a similar test of a low protein wheat resulted in a uniform increase in the protein upon both the Kansas and the California soils. So that it is sufficiently worked out that the climate is the chief factor in affecting the protein content of wheat.

It is, of course, acknowledged that wheats rich in protein are desirable as being more nutritious; and furthermore the protein content has an appreciable effect upon the baking quality. Utah Bulletin No. 72 says: "No matter what other factors may contribute towards quality in bread, that most desirable property known as 'lightness' depends primarily upon adequate amounts of gluten \* \* \* and that a definite relationship exists between the crude protein content of wheat and the crude protein and gluten content of flour \* \* \*."

From all of the above it is seen how climate, being the chief factor in influencing the composition of wheat, has thereby a considerable influence upon the baking qualities of the flour and in the quality of the resulting bread, although it is acknowledged that slight variations in protein content of the wheat can not be detected in the bread.

Now, when we take up the factors influencing the quality of rice we find we have a similar but a somewhat different proposition in that, while climate may change the quality in one sense of the word, yet no difference in the chemical composition can be found. In the annual report of the Hawaiian experiment station for 1909 will be found the following analyses:

	By the Exp. Station at Honolulu.		By the Bureau of Chemistry at Washington, D. C.	
Unpolished rice:	% protein.	Fat.	Protein.	Fat.
Imported Japanese rice..	7.09	2.08	7.19	2.08
Hawn.-grown Jap. rice .	6.79	2.10	7.38	2.23
Hawn.-grown Gold Seed..	7.14	2.13	...	..
Polished rice:				
Imported Japanese rice..	6.39	.64	6.63	.38
Hawn.-grown Jap. rice..	6.47	.71	7.31	.56
Hawn.-grown Gold Seed..	6.75	.46	...	...

The table shows that there is no chemical difference between the Japan variety or the Gold Seed, nor between the Japan variety when grown in Japan or in Hawaii. Yet the fact remains that there is a great difference in quality between these rices. To the American people who eat rice with milk and sugar, with gravies, with curry, in custards or in other ways, all kinds of rice taste pretty much alike, and because it is rice we think that if we eat it once in a week or a month, that is all we want of it. The taste of the Chinese for rice is one that is fixed by custom, and the same is true for the Japanese, with the difference that the latter people are more discriminating in their taste and will, if they are able, buy only rice that pleases them, while the Chinese will be contented with whatever rice happens to be the cheapest. The Chinese have been accustomed for generations to the rice which has a long, narrow kernel and which may be described as a dry rice, while the Japanese have been accustomed to the short, thick berry of what has been termed a glutenous rice but in which analyses, as shown, fail to find any extra amount of glutenous material.

A similar peculiarity of taste is shown by the fact that most Southern people prefer a soft, sugary sweet potato, while the Northern people who are accustomed to dry, mealy Irish potatoes show a preference for sweet potatoes of like description. The Chinese and Japanese, moreover, consume large amounts of rice and they eat it for the most part alone, without any of the fixings which the Americans commonly use.

When the Japanese of Hawaii found that the rice grown here did not come up to the quality of that to which they were accustomed, what more natural than that they should import rice from Japan to satisfy their wants? This they have done and are now doing to the extent of some 30,000,000 lbs. per year, and for which they pay a premium of one to two cents over the price for which they could obtain Hawaiian rice.

The Experiment Station has introduced various varieties of Japan rice in an attempt to obtain one that would be of the quality demanded by the Japanese population of Hawaii. Three have been tested and have been found to be to a certain degree of these varieties as well as one other of a previous introduction

inferior to the imported Japanese rice. Some of the local well-known Japanese, and also teachers and missionaries, have aided in these examinations. The latter through long residence in Japan have become quite expert in judging cooked rice, and they have agreed with the Japanese in saying that the newly introduced rices are greatly superior to any Hawaiian rices which they have tasted heretofore, but that there is yet a slight inferiority. Whether or not this deterioration results in one year or whether it is gradual through several years has not yet been fully determined, but that there is a difference was almost unanimously decided.

In just what respects the Hawaiian rices are inferior was a thing that was rather difficult to determine. Some said they lacked in oiliness, or in richness, and all were agreed that the drying out of Hawaiian rices when cold was the chief objection which could be made to them. Recently more detailed statements of the differences have been given to the writer, and from these it will be noticed that the difference is in culinary and physical properties, and in flavor, all of which properties depend upon the taste of the judge and can not be determined as accurately as can the differences in wheat by a chemist. The points given were as follows: Hawaiian rice requires more water in cooking; it swells less; it is harder than Japan rice; it is not so easily softened; to the tongue it has a coarse, rough feeling like cotton cloth to the skin, while Japan rice feels as silk; it has a peculiar smell when cooked—not so agreeable as has the Japan rice; the grains do not stand out vertically nor have they the luster which the grains of Japan rice have when cooked; it does not hold moisture when cold, but becomes dry and rubbery; it has inferior flavor; it has not the oily strength of the Japan rice.

If the points could be reduced to the score card form and the student could study rice by the card while tasting different samples, perhaps any one could be taught to be a good judge of rice as well as they are now taught to be of butter and of other products; but as this has not been done these points can be used by any one who desires to try and discover what is meant by "quality" in rice.

These differences apply particularly to the Hawaiian Gold Seed and to Chinese varieties of rice and to a lesser degree to the Japan rice when grown in Hawaii; and as stated above the latter has in some cases been pronounced equal to the imported article, but the consensus of opinion was that it was not equal. The judges call attention to the fact that the manner of cooking has much to do with the bringing out of the best qualities or properties of a rice and that a poor rice well cooked is better than a good rice poorly cooked. Whereas many cooks use two or three parts of water to one part of rice, it is stated that with less water the rice will be "flakey" rather than "soggy." I am indebted to Mr. H. Tsurashima of the Hawaiian Japanese Chron-

icle for the following directions for cooking rice: After washing the desired amount of rice until the water comes clear, add 1.3 pints of water for each pint of rice (1.1 pints for Japan rice); use a heavy wooden cover to prevent the loss of steam and juice (for this reason also a proportionately large cooking utensil is advisable); put over a strong fire where boiling will begin in ten minutes; boil ten minutes; reduce the strength of the flame and boil another ten minutes; reduce the flame to a very weak point and boil for another ten minutes; extinguish the flame and let stand for five minutes; it thus requires 45 minutes to properly cook rice, and during this time the cover should never be removed. Over anything but a gas stove, the kettle, of course, would be pushed to the rear or to the side to reduce the strength of the flame. When cooked in this manner all of the peculiar points above mentioned will be very strongly brought out, and the flavor especially will be such that even those who profess a dislike for rice, will find that it is one of the best of dishes. Furthermore, to a poor man it will be quite a saving if by using the proper method of cooking he can substitute rice for some of the other expensive sources of starchy foods.

After all of this discussion we are still in the dark as to what is the real cause of the difference in the quality of rice and why the Hawaiian-grown rice should be inferior to the imported article. The inferiority being principally, as shown, a matter of flavor, all that we know is that either in the climate or soil of Japan is some factor which is the cause of the superiority of the Japan rice. We have grown the same varieties and have cultivated them in the same manner as they are cultivated there. It may be that the cooler climate, or a difference in the length of the growing season, may account for the changes. Or it may be that the use of organic manures in large quantities, which practice is more common in Japan, exerts an influence upon the quality, and this reason has been suggested by one interested in the study of this problem. In accord with this, too, we find in the Experiment Station Record, Vol. 23, page 467, that: "In India a difference in composition of rice is noted, the average protein content being lower (6.58%) with Cuttack rice and the highest being 7.69% with Bombay rice, while the individual variations were from 5.44% in Cuttack to 9.80% in a sample of Broach." "Local reputation and market value coincide in some cases with the high protein content \* \* \* and in other cases there is no connection between them as in dadkhani rice of Bengal." \* \* " The richness of the grain appeared to be due to the method of cultivation rather than to the races (varieties) of plants, the grain having the better composition being grown upon rich virgin or highly manured land \* \* \* manuring of land appears to be one of the principal means of improving the quality of the grain for commercial and edible purposes." It was found with wheat that manuring slightly increased the

quality of the grain, but that this cause could be entirely offset by the effect by climate; whether or not the same would hold true for rice has not been determined, and much experimental work along that line remains to be done before we can be at all certain of the exact causes of what we know to be definite variations in the quality of rice.

## ECONOMIC ZOÖLOGY.

*Our Motto: "Utilization, not Extermination."*

Conducted by FRANK FINN, B. A., Hon. F. Z. S.

COCONUT ESTATES AND ARMY REMOUNTS.

(*Tropical Life* for April, 1913.)

Referring to the article in our July issue, "Remounts for the Army," in which we urge owners to seriously consider the possibility of breeding horses suitable for army remounts on large coconut estates, we see by the *Tropical Agriculturist* that the Ceylon Government is about to start a horse-breeding farm in the neighborhood of Ambepussa railway station. This establishment, adds our contemporary, should offer immense facilities for such work as has been indicated above. Mr. A. L. Hutchison, London correspondent to the *Times of Ceylon*, in commenting on, and supporting our suggestion, called attention to the success of the pony-breeding establishments on the Island of Delft, off Ceylon. "My pony, 'The Birdcatcher' (14.2)," he goes on to say, "which once had a great reputation in Haputale, was a Delft pony. He was hard to beat in the matter of stamina, and there was simply no tiring him. He was an Arab, and as the late 'Skip' Shelton used to say of him, he was 'a perfect miniature charger.' Something heavier and more of a weight-carrier could doubtless be bred."

This reminds us that the advice we give in our book on "Coconuts," as well as in the columns of this paper, urging estate owners and land proprietors to take up cattle-breeding, sheep-farming and hog-raising, so far as their means will allow, was given none too soon. On every side we are constantly hearing complaints of the shortage of food supplies, particularly of meat. Berlin had what almost amounted to a riot, owing to the high prices demanded, whilst even Switzerland, we believe, is importing Argentine cattle. In the United States, here in England, and elsewhere, the rise in the cost of meat and other foodstuffs is eating a big hole in the increased wages of the public; so much so that much as wagepayers are already complaining, it seems unlikely that the present level of wages has anything like touched its

highest. All this naturally affects the cost of machinery and manufactured goods sent by the meat-buying countries to the tropics. If, therefore, estate owners can see their way to increase the world's meat supply, they will not only benefit the public generally, but, by lowering the cost of living, or at least by helping to discourage its going still higher, they will benefit themselves in more ways than one.

The Ceylon papers, some time back, in speaking of the scarcity of meat, reported that at Matale prices showed a rise of 120 per cent. on November 12, for on that day there was only one ox available to supply eighty planters and their families on the estates, as well as the general public in the town. We feel that, in face of such news, one and all of our readers who can do so, will at once begin to seriously consider the rearing of cattle and other stock for supplying their meat to those requiring it, in the same enthusiastic and practical manner that they have done and are doing with the planting of rubber and coconut palms for their produce.

Meanwhile, with regard to the supply of remounts for the British army, matters do not mend. Mr. Walter Runciman, M. P., President of the Board of Agriculture, speaking at the conclusion of the Van Hoorse Parade held annually on Easter Monday in Regent's Park (London), told his hearers that a year ago a government publication put the deficiency of young horses at 200,000, and then he added: "It is vastly greater today."

Colonel Seely, M. P., Secretary for War, who also spoke, owned that it was a fact that the government was faced with a great difficulty. The number of horses available for peace times did not come up to the requirements of traction in war times.

Meanwhile, as the *Daily Mail* reminds us, the horse-breeding season starts about the end of March, and the present one promises to be much the most disastrous known. Small farmers have quite given up horse-breeding. The English government, unlike the German and French and Austrian governments, has done nothing to remedy the defect. Unless something is done the transition period, which Colonel Seely mentioned in his speech, will end in the extinction of the British war horse. The horses bred under the development grant scheme go for the most part abroad.

We feel justified, therefore, in again calling attention to our article, published in July, 1912, on "Remounts for the British Army: Can they be raised on Coconut Estates?" In face of the above statements, made by the highest authorities, the question of raising remounts in the Colonies should not be allowed to rest.

According to the *Journal of the Board of Agriculture* (England), it was clear that when coconut poonac was fed to cattle the butter made from their milk was much firmer; those, therefore, making butter in warm countries may find coconut cake of considerable advantage as a feed. These experiments were car-

ried out at Wye Agricultural College. We should be interested to know how similar experiments carried out with poonac fresh from the press, if fed to cattle on the coconut estate itself, would compare with above. Speaking of this reminds us that cream separators are now seen working in many big cities in India. They make a large quantity of separated milk available for use. Fuller particulars of the above will be found in the January *Journal of the Agricultural Institute*, Pusa, India.

According to the *Indian Trade Journal*, Mr. Ledgard, president of the Bengal Chamber of Commerce, in addressing the members at their annual meeting, referred to wool and sheep-breeding, pointing out that prices for wool had been advancing all over the world continuously since 1908, and India had kept pace with the advance, and the period of dear wool was not likely to be ended. The Indian government had under consideration the necessity of endeavoring to improve the breed of sheep on the plains of these provinces, and some rams were imported from a part of Australia the climatic conditions of which closely resembled those of this part of India. Breeding operations were going on, and an improvement in carcasses and wool was fully anticipated.

Experiments show that, so far as soya and cotton cake are concerned when feeding dairy cows in England, the one can be safely used as a substitute in a ration for the other. Although the results obtained were nearly equal for the two cakes, yet what slight advantage there was showed that soya cake was slightly better for milch cows than decorticated cotton cake, which is slightly richer in oil, while the soya cake is slightly richer in flesh producers.

## ARE DRY-FARMING METHODS AN ADVANTAGE IN THE TROPICS?

(*Tropical Life* for April.)

The manual on "Dry Farming: a System of Agriculture for Countries under a Low Rainfall," published by Dr. John A. Widtsoe, A. M., Ph.D., president of the Agricultural College of Utah, came to hand at much about the same time as we received an issue of the *Times of Ceylon* (February 4), with two most interesting articles on the possibilities of "Dry Zone Cultivation in Ceylon," the first being the report of a paper read by Dr. H. M. Fernando before the Ceylon Agricultural Society on the subject, issue of the *Times of Ceylon* (February 4), with two most interesting articles on the possibilities of "Dry Zone Cultivation in Ceylon," the first being the report of a paper read by Dr. H. M. Fernando before the Ceylon Agricultural Society on the subject, and the second a series of paragraphs by the paper itself dealing with various products that might be cultivated by dry-farming methods. Both the book and these articles should be carefully



studied by all those owning or interested in lands in tropical centers, as by their doing so many areas at present neglected and further deteriorating would, we believe, not only be made revenue yielders, but would also tend to become more fertile. "Nearly six-tenths of the earth's land surface," Dr. Widtsoe tells us, "receive an annual rainfall of less than 20 in., and can be reclaimed for agricultural purposes only by irrigation and dry farming. A perfected world-system of irrigation will convert about one-tenth of this vast area into an incomparably fruitful garden, leaving about one-half of the earth's land surface to be reclaimed, if at all, by the methods of dry farming." Unfortunately we have no room to properly review the book, but a glance at the index is bound to send the most indifferent cultivator, if he is in any wise worthy of the name, foraging through the book to see what it has to say. Take the question of root systems, to which Chapter VI is devoted: here we find discussed such matters as functions, kinds, extent, and also depth of root penetration. The present status of dry farming is described in Chapter XVIII throughout the United States, and then in Mexico, Brazil, Australia, Africa, and the East. So much for places; now for products; and the *Times of Ceylon* again. This paper tells us that "The growing demand for land for the cultivation of the more important commercial products and the opening, in recent years, of extensive plantations has resulted in a very large area of what is considered suitable land being absorbed: the possibility of cultivation in the dry zone (i. e., of Ceylon) has therefore been attracting attention for some time; this being so, the point to be considered is what products can be profitably cultivated in this arid zone." The following crops are discussed and recommended: Ceara rubber, tobacco, cassava, chillies, ground-nuts, as well as the raising of stock and the fodder to feed them. Dr. Fernando's paper also discusses the same ideas. From all we can learn from these and other reports on the utilization of tropical areas with a low rainfall, we feel certain that a far larger number of land-owners should make careful studies of the advantages offered by the modern system of dry farming.

Dr. Widtsoe's remarks on pp. 92, 93 are worth noting by those who believe, as we do, in breaking up the top soil between cacao, rubber, and other trees in the tropics, to conserve the moisture during times of drought, by breaking the capillary attraction that draws the subsoil water to the surface when it evaporates and is lost, but fear to do so, lest by damaging the surface roots they do more harm than good. "A great deal," he tells us, "has been said and written about the danger of deep cultivation, because it tends to injure the roots that feed near the surface. True, deep cultivation, especially when performed near the plant or tree, destroys the surface-feeding roots, but this only tends to compel the deeper lying roots to make better use of the subsoil. When the subsoil is fertile, and furnishes a sufficient amount of water, destroying

the surface roots is no handicap whatever. On the contrary, in times of drought, the deep-lying roots feed and drink at their leisure, far from the hot sun or withering winds, and the plants survive and arrive at rich maturation, while the plants with shallow roots wither and die, or are so seriously injured as to produce an inferior crop (for reasons stated); an excess of moisture in the upper soil when the young plants are rooting is really an injury to them." There are those who claim that no one can plow between cacao and rubber trees, but we know that they can and do cultivate if they are wise, and as a proof that what we say is correct, at any rate as regards rubber estates, we have borrowed a photograph from Messrs. Marshall, Sons & Co., Ltd., of Gainsborough (Eng), showing their oil tractor at work between the young trees on an Eastern rubber estate. The block included here shows that the tractor and cultivator can easily pass up and down between the trees, and by doing so the fertility and yielding-power of the soil is greatly increased.

Those who have stood in cacao and other estates in the full tropics, where damp and heat are rampant, if they are not prejudiced against inter-crop cultivation, must realize as they notice the damp, dark, often sourish soil, the moss growing over it and up the trunks, lichens and epiphytes also, what an advantage it would be to break up this top spit and let out, in this case, excess moisture, and allow air to get down below. This is in the wet or damper seasons. In the dry seasons, and those of prolonged drought, as Trinidad and the West Indies have been suffering from, this broken surface would turn into a dust mulch, and the roots driven downwards in consequence of your having persistently ruptured the surface weeders, would surely, as Dr. Widtsoe says in speaking of arid lands, find that coolness, air and moisture below that they cannot obtain nearer the surface, and which, on uncultivated areas, they would never have access to.

### *THE INTERNATIONAL RUBBER EXHIBITION, LONDON, 1914.*

(From *The Rubber World Supplement*, March 27, 1913.)

The matter we print this week relative to the fourth International Rubber Exhibition, to be held in London next year, may well make some people rub their eyes in astonishment. Another exhibition in active preparation! Fifteen months seems a long time to look ahead; yet when the interests affected are world-wide fifteen months disappear almost in a flash, and the next great International Rubber Show to be held in London combined with the first Cotton, Fibres, and Tropical Products Exhibition, already to a very large extent shapes itself in the brain of the organizer. Successful exhibitions are the result of long-continued and wholly strenuous preparation. There are big things to be compassed,

a thousand ideas to be elaborated, proposals affecting whole countries and a vast and many-sided industry to be discussed and decided upon. The correspondence and the interviews, which are the essential preliminaries, in themselves call for stupendous effort: the allotment of space demands mathematical precision, and that in its turn must be supplemented by the spirit of the artist if the result is to be anything more than a heterogeneous collection of items large or small. Run one's eye over the Advisory Committee, and when one realizes that there is not a name in the list which is not there by written authority, one may well understand that even this trial-canter is no mean accomplishment. Beside the preparatory work the final metamorphosis of the venue of the Exhibition, whether it be in the Agricultural Hall in Islington or the New Grand Central Palace in New York, is a detail. Yet what a detail! A week before the Rubber Exhibition was opened in New York, floors were bare, spaces were unoccupied; on the opening day floors and spaces had been filled with heavy machinery, or tons of rubber, or stands which represented big concerns; it all seemed to spring into existence by magic, and when the closing hour struck, by magic again it disappeared. The magic was just that of the organizing brain, which mapped out everything months in advance.

So here we are again with another International Rubber Exhibition in full preparation. The 1914 Exhibition bids fair to eclipse its predecessors in every respect, and its interest and importance will be augmented by its joint character—the tropical products other than rubber making the appeal doubly strong. The day has long since gone by when there can be any question as to the effect exhibitions have on business. They are an education in that they bring people interested into direct touch with the latest developments of the industry. They give people who would never otherwise come together opportunities of exchanging ideas, and for years after the exhibition its influence is felt in ways which it is not always easy to trace to the proper source. In New York, among the things that impressed one most was the surprise of certain American firms who had not exhibited before at the amount of direct business which had resulted. What the indirect effects would be no one could predict, but they certainly would be considerable. The 1912 Exhibition did in America what the 1908 Exhibition did in London; it brought planter and manufacturer and machinery maker for the first time into personal relationship, and that must affect the whole future of the industry. The 1914 Exhibition should be the greatest of the series because exhibitors as well as organizers know better each time how to make the most of opportunities. So far as one country at least is concerned the event will be peculiarly opportune. The Planters' Association of Ceylon will celebrate its Diamond Jubilee next

year, and the Ceylon section should make a Diamond Jubilee exhibit of the product which crowns the prosperity of the plantation industry sixty years after the Association was founded

E. G. S.

## DIVISION OF ANIMAL INDUSTRY.

Honolulu, April 30, 1913

Hon. W. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry.

Sir:—Reporting on the work of this division for the period of April and part of May, exclusive of the matters dealt with in an intermediate report of April 22, I would say that the work of reconstructing the animal quarantine station has been pushed so far as the weather has allowed, the frequent heavy rains having made it impossible to undertake any concrete work up to this date.

It may, however, be stated that the vexing question of keeping the animals from destroying fence posts and gates seems to have been solved, cheaply but effectively, by increasing the number of posts so that no distance between them exceeds eight feet, tying the tops with a 2'x4' running plate or stringer and applying a heavy coat of paint and sand to all exposed woodwork. When dry the paint and sand form an apparently effective protection against the teeth of horses and mules, no attempt to bite the woodwork having occurred for a period of nearly three weeks, during which time the pen first finished as described has been constantly filled with mules to its capacity; that is, from 25 to 30 head. There is, of course, the possibility of the sand being worn away by rubbing, but if closely watched this contingency may be easily guarded against.

Owing to continuous heavy showers it became necessary to lay off the carpenters for nearly the entire past week, and concrete work could not be thought of. This work will, however, be started in a few days, and, with the Board's permission, it will be done by day labor, not by contract, using the same men who have been employed there for the past month. The reasons for this suggested change are, in the first place, that I can save from \$50 to \$75 on the job; second, that it will be impossible to empty a sufficient number of cages long enough for the concrete to harden—if the work is done by contract; and, finally, that the carpenter now in charge is not a "concrete man" and consequently does not care to take a contract on the job. I have, however, familiarized myself with this work and feel confident that I can supervise both the mixing and the laying of the concrete and, as stated, reduce the cost considerably. The main point, however, is that only a limited number of kennels can be emptied

at one time—a condition that no contractor could put up with—while by day labor I can employ the men on other work while the concrete is hardening.

#### HILO QUARANTINE STATION.

While the final contract and bond has not been received from Dr. Elliot as yet, the president of the Board, who has just returned from Hilo, has informed me that arrangements have been made for the construction of the station and that work will be commenced without delay. When received these papers should be filed with the Auditor of the Territory without delay so as to enable him to make the requisite disbursements.

#### KAILUHI QUARANTINE STATION.

I regret to report that to this date I have not succeeded in reaching a satisfactory arrangement for the building of this station, the appended correspondence showing the present state of the negotiations. As will be seen, the delay is due to the threatened tariff revision, but in case the managers of plantations and ranches most interested in the building of the station should refuse to undertake its construction, it will become necessary to have the work done by some contractor, and to reduce the size of the station sufficiently to allow for his profit and at the same time keep within the limits of the appropriation. I have today written Dr. Fitzgerald to take this matter up without delay, stating that the Board expects him to give his time and services to the same without stint.

#### TUBERCULOSIS CONTROL WORK.

During the past few weeks this office has received from the Board of Supervisors a number of applications for the testing of dairy cows for tuberculosis, as required by the regulations of that Board. The animal test of all dairy cattle in this county should not be postponed any longer than is absolutely necessary, owing to the constant danger of the disease spreading where any cases may have been left or have developed since the last test. It is therefore respectfully recommended that this division be allowed \$100 for the month of June, for the employment of a lay inspector to assist in this work, so that the annual test may be started on June 1 instead of July 1. This work will also require the complete overhauling of the automobile, which needs a new set of fenders as well as to be painted and varnished.

#### GLANDERS.

I regret to report that Dr. Eliot has found two cases of glanders in a plantation stable near Hilo. Every precaution was taken

to check the outbreak immediately and no new cases have been observed during the past week. It is possible that the cases may have been epizootic lymphangitis, the specific infection of which is able to survive outside of the animal organism for a long period, which theory is borne out by the fact that no cases of glanders have occurred in that neighborhood for more than two years, and there is consequently no cause for alarm.

#### IMPORTATION OF LIVE STOCK.

As will be seen from the appended report of the Assistant Territorial Veterinarian, an unusually large number of live stock has arrived here recently, the greater number by far being mules for plantation work. The quarantine station has consequently been taxed to its capacity, necessitating the employment of an extra laborer as authorized by the Board.

Very respectfully,

VICTOR A. NORGAARD,  
Territorial Veterinarian.

#### REPORT OF ASSISTANT VETERINARIAN.

Dr. V. A. Norgaard, Chief of Division of Animal Industry.

Sir:—I beg to submit the following report for April, 1913:

#### *Tuberculosis Control.*

During the month the following animals have been subjected to the test:

Waialae Dairy, April 11-14—15 cows, 1 bull; 15 passed, 1 condemned.

M. Riedell, April 14-17—1 cow; passed.

C. K. Quinn, April 18-21—5 cows; passed.

In the bull in the Waialae herd we had an opportunity to test again the accuracy of the intradermal method. This animal had three large swellings in the submaxillary region which very closely resembled tubercular abscesses. To the touch they were quite firm, leading one to suspect that they were entirely encapsulated. They were not adherent to the skin or to the jawbone. Upon being subjected to the test the bull showed not the slightest reaction, which was surprising considering the presence of these swellings. The owner was advised to have the glands removed and to send some of the material to the laboratory for examination. This was done, the glands being removed by a local veterinarian and a portion of the material sent to the laboratory for diagnosis. A microscopical examination proved the abscesses to have been formed by the *Actinomyces* fungus. The bull was given the potassium iodine treatment for Actinomycosis and is

showing a perfect recovery. In the failure of the intradermal tuberculin test to cause a reaction it has again demonstrated its reliability and accuracy.

*Importations of Live Stock Through the Port of Honolulu,  
April, 1913.*

April 2—S. S. Hilonian, Seattle: 1 crate chickens.

April 2—S. S. Arizonan, Seattle: 24 horses, Chas. Bellina; 15 horses, S. Macpherson.

April 4—S. S. Siberia, San Francisco: 2 elk, H. Hackfeld & Company.

April 8—S. S. Lurline, San Francisco: 24 mules, Schumann Carriage Company; 1 bull, F. M. Swanzy; 2 pigs, Club Stables; 24 crates chickens, N. B. Lansing; 1 crate chickens, Club Stables.

April 11—S. S. China, San Francisco: 1 dog (English setter), Mrs. F. A. Bell.

April 12—S. S. Virginian, Seattle: 20 mules, 1 cow, S. S. Paxson; 1 deer, Geo. Rodiek.

April 14—S. S. Sonoma, San Francisco: 8 crates chickens.

April 15—S. S. Mongolia, Orient: 2 crates Japanese games.

April 15—S. S. Wilhelmina, San Francisco: 37 crates poultry.

April 18—S. S. Manchuria, San Francisco: 1 dog, H. McNutt; 1 dog, Mr. Beswick.

April 18—S. S. Ventura, Sydney: 1 dog (fox terrier), Mr. Bonamy. This dog was allowed to enter the Territory free from quarantine, as rabies is not known to exist in New South Wales, and was accompanied by the required certificate of health.

April 22—S. S. Honolulan, San Francisco: 26 mules, C. E. Wright; 25 mules, Schumann; 2 mules, 9 horses, Domingo Ferreira; 29 horses, Oahu Polo Club; 38 crates poultry.

April 22—S. S. Hyades, Seattle: 1 German coach stallion, 8 Berkshire hogs, Alexander & Baldwin.

April 23—S. S. Marama, Vancouver: 1 dog (fox terrier), Miss Braisted.

April 28—S. S. Sierra, San Francisco: 56 crates poultry; 1 dog, Rubert Jeffkins; 1 dog, Mrs. H. O. Clark.

Respectfully submitted,

L. N. CASE,  
Assistant Territorial Veterinarian.

## DIVISION OF ENTOMOLOGY.

Honolulu, April 30, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of April as follows:

During the month 38 vessels arrived, of which 26 carried vegetable matter and two vessels moulding and building sand.

Disposal.	Lots.	Parcels.
Passed as free from pests.....	693	15,492
Fumigated . . . . .	6	43
Burned . . . . .	33	52
Returned . . . . .	2	11
Total inspected . . . . .	734	15,598

Of these shipments, 15,351 packages came as freight, 129 packages in the U. S. mail and 118 packages as baggage.

*Rice.*

During the month 17,160 bags of rice arrived from Japan and 1000 from China. All the different lots were examined and found free from pests and were passed.

*Pests Intercepted.*

Forty-two packages of fruit and 9 packages of vegetables were found in the baggage of passengers and immigrants from the Orient, which were seized and destroyed.

For the second time we found the nymphs of a locust or Cicada in the soil around plants; this shipment, however, from Manila instead of Japan.

Eleven boxes of Mexican limes arrived from San Francisco, and as such fruit is prohibited from entry here, it was returned by the same steamer.

*Hilo Inspection.*

Brother M. Newell reports the arrival of six vessels, five of which brought vegetable matter, consisting of 67 lots and 1168 parcels. All lots were passed and but two cases of celery had to be cleaned.

*Beneficial Insects.*

Four lots of inoculated Japanese beetles were distributed to parties furnishing the beetles.



I received a letter from Mr. D. Morrison, agent for the Commercial Pacific Cable Company on Midway, in which he reports that no reappearance of the cottony cushion scale has occurred up to March 31. (Over a year ago we sent a large colony of vedalia, with plenty of food to carry over on the trip, and at that time had the gratifying news that the ladybirds arrived in good condition. Mr. Morrison feels very grateful for the assistance my department has given him.

### *Queenbees.*

A shipment of four queenbees arrived by mail, and after examination and being satisfied with the accompanying certificate, they were allowed to be delivered.

### *Inter-Island Inspection.*

During the month of April 62 steamers were attended to and the following shipments were passed:

Plants . . . . .	80 packages
Taro . . . . .	726 bags
Fruit . . . . .	8 packages
Lily root . . . . .	35 "
Vegetables . . . . .	5 "

Total passed . . . . . 854 packages

The following packages were refused shipment:

Fruit . . . . .	21 packages
Plants (rejected on account of soil) . . . . .	14 "
Lily root (rejected on account of soil) . . . . .	1 package

Total refused shipment . . . . . 36 packages

Respectfully submitted,

E. M. EHRLHORN,  
Superintendent of Entomology.

### DIVISION OF FORESTRY.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I have the honor to submit as follows the monthly report of the Division of Forestry for April, 1913:

During the first part of the month my own time was spent in Honolulu attending to various routine matters in connection with forest work.

From April 16 to 25 I was on the Island of Hawaii making an

inspection of forest planting on Kohala Mountain, above Waimea village, of fences on forest reserve boundaries on the land of Humuula, and of forest planting in progress under the requirements of government leases on both the Kukaiau and the Parker ranches. I also visited two of the experimental tree-planting plats on the slopes of Mauna Kea and the forest nurseries of the Parker Ranch at Waimea and Waikii.

(Owing to the long continued dry weather, all forest planting, both on the Parker Ranch and at Kukaiau, has been delayed. Especially at Waimea a large number of seedling trees have had to be held in the nursery awaiting suitable conditions until they could be planted out. The trees planted in 1911 and 1912 on the government land of Puukapu, above the old Puukapu Homesteads and on the adjoining fee simple land of Waikoloa, have made an encouraging start, with very few losses, but the trees are not as far advanced in growth as they would have been had the weather conditions been more favorable.

While at Waimea I also looked carefully into the question of doing further planting on the government land on the mountain and of fencing the Kohala Mountain Forest Reserve boundary.

### *Forest Fire Record.*

A forest fire in the upper portion of the Ninole Homesteads, Kau, Hawaii, is reported by the local district fire warden, Mr. Geo. Gibb of Naalehu, as having occurred on April 20. "About 300 acres of farm and scrub guava lands" were burned over. The burnt area "did not extend to the forest proper, confining itself to the valley between Pakua and the land of Punaluu." It was fought by laborers from the Makaanau and Ninole camps of the Hutchinson Sugar Plantation Company under the direction of Mr. de la Nux, head luna for that section.

At the meeting of the Board of Commissioners, held on April 23, 1913, the following additional appointments were made in the staff of district fire wardens:

### *Kauai.*

Mr. Frank A. Alexander, in and for that portion of the District of Kona extending from the Hanapepe Valley to the Puna District line.

Mr. Gaylord P. Wilcox, in and for that portion of the Districts of Koolau and Puna extending from the land of Anahola to the land of Olohena inclusive.

### *Oahu.*

Mr. Andrew Adams, in and for that portion of the District of Koolauloa lying to the north and east of the lands of Kaunala.

Mr. C. J. Wheeler, in and for that portion of the District of Koolauloa from the Waialua District line to and including the land of Kaunala.

*Hawaii.*

Mr. Alexander Morrison, in and for that portion of the District of Hamakua extending to the west from the boundary of the land of Paauhau, Island of Hawaii.

*Nurseryman's Report.*

As usual, the report of the Forest Nurseryman is transmitted herewith.

Very respectfully,

RALPH S. HOSMER,  
Superintendent of Forestry.

REPORT OF FOREST NURSERYMAN.

Honolulu, April 30, 1913.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir:—The following report gives the principal work done during the month of April:

*Nursery.*

*Distribution of Plants.*

	In seed boxes.	In boxes Transplanted.	Pot Grown.	Total.
Sold .....	5500	200	480	6180
Gratis .....	200	480	564	1244
	5700	680	1044	7424

*Collections.*

Collections on account of plants sold amounted to.....	\$ 7.95
Collection on account of seed sold amounted to.....	6.55
Rent of building, Nursery grounds, for month of March..	35.00
Total .....	\$49.50

*Plantation Companies and Other Corporations.*

The distribution of trees to plantation companies amounted to

9000 in seed boxes, 200 in transplant boxes and 1324 pot grown; total, 10,524.

*Experimental Gardens, Makiki.*

The transplanting of seedlings, sterilizing and mixing soil, etc., have constituted the principal work.

*U. S. Experimental Planting, Nuuanu Valley.*

Over 2000 assorted trees have been planted in tin cans at the small nursery beside the quarters. These will be in good shape when required for further planting.

Very respectfully,

DAVID HAUGHS,  
Forest Nurseryman.

*BY AUTHORITY.*

NEW FIRE WARDENS.

Several changes in the staff of District Fire Wardens were made at the meetings of the Board of Agriculture and Forestry held on March 21 and April 23, 1913, by the appointment of the following gentlemen for the districts named:

KAUAI.

*Gaylord P. Wilcox*—In and for that portion of the Districts of Koolau and Puna extending from the land of Anahola to the land of Olohena, inclusive.

*Frank A. Alexander*—In and for that portion of the District of Kona extending from the Hanapepe Valley to the Puna District line.

OAHU.

*H. Blomfield Brown*—In and for that portion of the District of Ewa lying to the east of the main government road between the land of Waipio and the Kaukonahua gulch.

*George M. Robertson*—In and for that portion of the District of Wai-alua lying between the Halemano and Opauala gulches.

*George Wilson*—In and for that portion of the District of Wai-alua lying between the Opauala gulch and the Koolauloa District line.

*Otto Ludloff*—In and for that portion of the District of Koolaupoko extending from and including the land of Heeia to the land of Kailua.

*C. J. Wheeler*—In and for that portion of the District of Koolauloa extending from the Wai-alua District line to and including the land of Kaunala.

*Andrew Adams*—In and for that portion of the District of Koolauloa lying to the north and east of the land of Kaunala.

MAUI.

*Arthur K. Jones*—In and for the Districts of Honuaula and Kahikinui.

## HAWAII.

*George Gibb*—In and for that portion of the District of Kau extending from the land of Punahoa to the Kona District line.

*Donald S. MacIhster*—In and for that portion of the District of Hilo extending from and including the land of Kukaian to the Hilo District line.

*Alexander Morrison*—In and for that portion of the District of Hamakua extending to the west from the boundary of the land of Pauhau, and April 23, 1913, by the appointment of the following gentlemen for the districts named:

W. M. GIFFARD,  
President and Executive Officer,  
Board of Agriculture and Forestry.

### AGRICULTURAL EDUCATION IN THE UNITED STATES OF AMERICA.

We extract the following from an article written by G. J. Bosman, B. S. A., to the *South African Agricultural Journal* of January, 1913:

Perhaps no other country in the world is doing more for agricultural education today than the United States of America. In each of the forty-eight States and Territories constituting the Union is an agricultural college with an average attendance of about 400 students. In connection with each of these State colleges is established at least one experimental station equipped with an efficient staff of agricultural experts. Furthermore, in a great many States they have gone so far as to have a special agricultural teacher in each high school and normal college. Teachers in the rural public schools are required to have a knowledge of the elements of agriculture so that they can devote a few hours each week to the teaching of that. The American people realize the necessity of teaching the farmer his profession. Through the colleges, high schools, and experiment stations only a small percentage of the people is reached, so another institution or force was created with special purpose of taking scientific knowledge of agriculture to the homes of the farmers. This force was called the Extension Department. The Extension Department teaches the farmer agriculture; his wife, household science; and the boys and girls are being interested in the junior work of these two branches.

The following are a few methods used in imparting this knowledge to the people:

(a) Short winter courses held in local communities lasting from one to two weeks, and covering the studies of field crops, soils, live stock, and home economics.

(b) Special educational trains traversing the State, on which are discussed such subjects as mealie culture, hog raising, dairying, and domestic science.

(c) Farmers' institutes, boys' judging contests, boys' camps,

farmers' picnics, etc., are supervised by the Extension Department.

(d) Experimental and demonstration work on county farms is conducted by the department.

(e) Dairy test associations are formed by the department.

(f) Organizations, such as agricultural clubs, farmers' co-operative organizations, etc., are established.

(g) Schools, both secondary and common, county superintendents and teachers' institutes are held.

(h) Junior work with boys and girls is carried on.

(i) Publications, such as bulletins, circulars, leaflets, and score cards, are issued and distributed by the department.

(j) Correspondence covering all sorts of questions pertaining to the farm and home is answered.

#### SCHOOLS.

The best way of reaching the largest percentage of boys and girls upon farms with information on agriculture and domestic science is through the medium of the country school. The Extension Department is doing a great deal in promoting the idea of having agriculture taught in the country school. The need of teaching agriculture and domestic science in public schools is obvious if we take into consideration that only a fraction of one per cent. of the pupils of schools ever attend college. Already much is done in the United States of America to get agriculture taught in the public rural schools. The development of this line of work is of the greatest importance as it affects the rising generations of the nation.

#### JUNIOR WORK.

In the State of Iowa, United States of America, seven thousand boys and girls are taking special work in mealie-growing, gardening and domestic science. This work is done according to directions sent out by the Extension Department. The competition among these youngsters is strong in the annual contest and exhibits held at short courses. A couple of years ago the highest yield of mealies produced per acre by one of these boys engaged in this kind of work was 118 bushels, or in South African measure 38 bags. This boy has consequently done a noble work by getting four times as much as the average yield of the mealie belt of the States. He has demonstrated to the farmers the possibilities of mealie culture in the states. The boys in the different counties carrying on this work, obtaining the highest yield, were given a free trip to Washington, and had the honor of being the guests of the President for a few days. The girls who had won in the cooking and sewing contests were given the same privilege. In America the question is not how to arouse interest for this

work among the youth, but to get help enough to keep up with the demands for this kind of work among the people.

#### ORGANIZATION AND COÖPERATION.

Probably the greatest need among our farmers today is organization. The rural people need debating societies, clubs of various kinds, and organizations that will "boost" for better agriculture and the welfare of the farmer.

Hand in hand with organization goes coöperation, without which not much can be done to promote agricultural interests. The "working together" of the farmer and the business men in towns in the States is noteworthy. The business men are ever ready to assist financially and personally in all kinds of work like the organizing of a short course, giving premiums for contests and exhibits, etc.

The press also lends valuable assistance by using their papers to advertise and consequently make more successful short courses, institute work, and special agricultural trains. They also open their columns generously for disseminating information that help towards the upbuilding and bettering of agriculture throughout the country.

The above brief sketch of the different branches of work carried on by the department gives a general idea of the scope of the work. The prejudice some of the farmers had at first against agricultural experts has died away long ago. The American people have wakened up and are demanding agricultural education. The Extension Department with its staff of energetic bright men is the powerful machine that is revolutionizing the agriculture of today. Through the efforts of this organization more agricultural products are produced, better men and women are made, and happier homes are being established.

May the day soon dawn when in the Union of South Africa we will have such a powerful force at work which will revolutionize agriculture in our country, the same as was done in the United States of America!—*The Tropical Agriculturist*.

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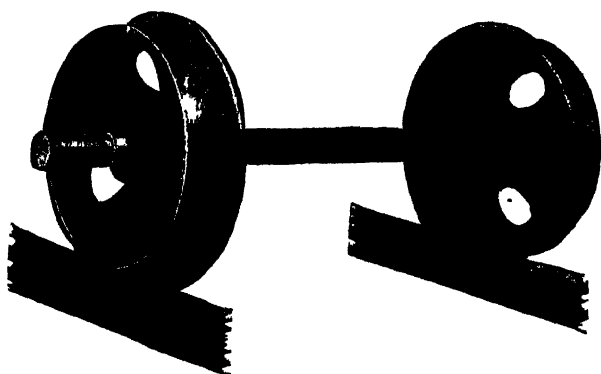
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# THE HAWAIIAN FORESTER AGRICULTURIST

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## *EXCHANGE CHANGES OWNERS.*

Among the most valued of our exchanges has always been the Tropical Agriculturist, published at Colombo, Ceylon. Its issue for March last contains an interesting announcement beginning thus: "The Tropical Agriculturist, hitherto the property of Messrs. A. M. & J. Ferguson, has been acquired by the Ceylon Agricultural Society who are now the sole owners of the journal. This is an event on which we think we may congratulate both the society and Messrs. Ferguson; the former on having become the owner of the foremost unofficial journal of tropical agriculture in the world, the latter on having successfully relaunched a great journal upon a career which we hope will be a fitting sequel to its past by achieving yet greater popularity." In further remarks the journal says that, while the affairs of the society owning it must come first, "yet its responsibilities extend far beyond the limits of this island, embracing indeed the whole tropic world and much of the sub-tropic." This view of itself by the Tropical Agriculturist may be conscientiously endorsed by the Hawaiian Forester and Agriculturist, which finds valuable resources of selected matter for its pages in its Ceylon contemporary, as well as noting with pleasure that the latter frequently utilizes the information put forth by experts connected with the territorial and federal agricultural investigations constantly being made in the Hawaiian Islands.

## *THREE FOREST RESERVES ON OAHU.*

On May 31, 1913, the Governor of Hawaii and members of the Board of Commissioners of Agriculture and Forestry held a public hearing to consider the setting apart of three forest reserves in the Waianae District, Island of Oahu. The areas proposed to be reserved consist of the slopes at the heads of the valleys of Nanakuli, Keaau and Makua and of the upper part of the land of Kuaokala. Altogether the area amounts to 6160 acres, of which all but 340 acres is government land.

The object in setting apart these reserves is to bring about the reforestation of the upper portions of the valleys named with native Hawaiian vegetation—trees, shrubs and other under-

growth. When the old time cover is restored it is believed that the springs and small streams rising on the slopes can be much more depended on than at present. In a district naturally as dry as is Waianae, every possible source of water counts, and is therefore worthy of being carefully protected. The creation of these reserves is a step in this direction.

Following are the reports of the Superintendent of Forestry setting forth the reasons why these areas should be made forest reserves. All three projects have been approved by Committee on Forestry, and its recommendations were adopted by the full Board at the meeting held on March 21, 1913:

## REPORTS OF THE SUPERINTENDENT OF FORESTRY.

### NANAKULI FOREST RESERVE.

Honolulu, Hawaii, August 9, 1912.

Committee on Forestry, Board of Commissioners of Agriculture and Forestry, Honolulu, Hawaii.

GENTLEMEN:—Following is a report, with recommendations, upon the setting apart as a forest reserve of the mauka portion of the unleased government land of Nanakuli, District of Waianae, Island of Oahu: 1010 acres.

The proposed Nanakuli Forest Reserve joins on the north the Lualualei Forest Reserve, proclaimed November 30, 1906, and on the east a proposed reserve embracing the upper portions of the fee simple land of Honouliuli, which latter project will shortly be brought before the Board for consideration.

Nanakuli is the first from the south end, of the valleys on the western side of the Waianae Hills. In topography it is similar to the other valleys on that side of the range, as far as and including Makua. All present essentially the same problems and in general should be treated more or less alike, although each valley has an individuality that makes separate consideration desirable.

One essential point in common is that all these valleys are on the lee side of Oahu and hence are in a dry district where every source of water, present or prospective, has high value. The forest problems here are to restore, as far as may be practicable, the original conditions of forest cover on the upper slopes, where appear the scanty but highly valuable springs, and to arrange for the extension of the forest, naturally or by artificial planting, on such sections of the lower slopes as cannot to good advantage be devoted to more intensive forms of agriculture.

In Nanakuli the forest line has been drawn around the upper portion of the valley, at the base of the steep slopes. Above this line, in my judgment, the native forest should be assisted to come back and should thereafter be there maintained. If this is done I believe that springs that are now irregular and that flow only

for a short time after rains will be made more steady and dependable. It is not contended that even with a dense forest cover on the slopes—of trees, shrubs and undergrowth—would the flow of these springs be permanent, but it is my belief that were the native forest restored, the regularity and duration of their flow would be sufficiently improved to justify the gathering of water, at any rate for a part of the year, through a pipe system from different sources, into centrally located tanks or reservoirs where the water would be available for use in connection with the lower lands. The first move in such a program is to get the forest back; the initial step is to set the area apart as a forest reserve. The purpose of this report is to recommend such action. The area is 1010 acres.

Nanakuli is a government land on which a grazing lease, held by the Dowsett Company for a considerable term of years, expired last February. The lower lands of Nanakuli are now (August, 1911) being again offered for lease. One of the conditions of the new lease is that a fence shall be built and maintained on specified portions of the forest line, whereby the forest will be protected. The remainder of the forest line, along the lower boundaries, follows natural barriers where fencing is unnecessary. The upper boundary of the proposed reserve is the crest of the main Waianae ridge.

One point about the boundary on its lower side perhaps deserves special mention, the inclusion in the forest reserve of the small lateral valley on the right or east side of Nanakuli Valley. There is now no water in this valley, but while obviously it is of much less moment than the section nearer the head of the valley, it seems to me that it should be included in the reserve. I endeavored to have the fencing provision in the Nanakuli lease include this lateral valley as well as the area further mauka. This was not done. Consequently, while included in the reserve this side valley will not be fenced off. The upper slopes are, however, fairly steep so that to some extent they protect themselves.

At present the forest in Nanakuli, apart from Algaroba on the lower lands and scattering groups of Kukui along some of the stream beds, is limited to groups of native trees well up on the slopes where they have been more or less out of the reach of cattle. With the construction of the fence on the forest line depredations by grazing will be stopped and much young growth, both of trees and undergrowth, ought soon to be in evidence. The ultimate object is to get back on the slopes as dense a cover of native forest as possible—in other words, to restore the jungle.

As well as from grazing the forest in Nanakuli has been subjected to injury by goats. Systematic shooting by Mr. H. M. von Holt above his outing house, "Pa Lehua," has helped to keep the goats away from the ridges at the head of Nanakuli, but a considerable band is said still to infest the crag on the west side of the valley known as Haleakala. One difficulty in arranging

for hunting goats here as a condition of the lease of the lower Nanakuli lands is that the Halcakala ridge is partly in Lualualo. Under the new lease of Nanakuli provision is made, along with clauses covering the exclusion of cattle from the forest area, for some goat hunting, but to exterminate the goats regular hunters will probably have to be employed by the government. This is a matter which ought to receive attention, not only in Nanakuli, but as well in all the valleys along the leeward coast of Oahu.

For the reasons above set forth,—in brief, that by helping the native forest to come back at the head of Nanakuli Valley, the local water supply stands to be improved, I do now recommend that the Board of Agriculture and Forestry approve the setting apart of the area covered by the following technical description prepared by the Government Survey Office, as the Nanakuli Forest Reserve, and I further recommend that the Governor of the Territory of Hawaii be requested to proceed after the customary manner, officially to set this area apart.

[The technical description of boundary is here omitted as it will later be published in the Forester as a part of the proclamation of the Nanakuli Forest Reserve.]

Very respectfully,

RALPH S. HOSMER,  
Superintendent of Forestry.

MAKUA-KEAAU FOREST RESERVE.

Honolulu, Hawaii, September 10, 1912.

Committee on Forestry, Board of Agriculture and Forestry, Honolulu, Hawaii.

GENILEMLN:—I have the honor to submit as follows a report recommending the creation of a forest reserve and the setting apart as portions thereof of parts of the government lands of Makua, Kahanahaiki and Keaau in the District of Waianae, Island of Oahu. Included in the proposed reserve is also a small portion of the privately owned land of Ohikilolo, belonging to Mr. L. L. McCandless; (340 acres). The lower portions of the two government lands first named are under lease to Mr. McCandless for a ten-year period, until February 21, 1920. The lease (No. 730) contains the provision that a fence shall be built on the forest reserve boundary within one year after the date of the creation of the forest reserve. The total area of the proposed reserve, which I suggest be called the Makua Forest Reserve, is 4716 acres.

The object of the proposed Makua Forest Reserve is to control the slopes at the heads of the several important valleys on the leeward side of the Waianae Range. The idea is, eventually, to replace on these slopes a dense cover of forest—Hawaiian trees, shrubs and undergrowth—in the expectation that thereby the

local sources of water may be protected and the flow from them made more dependable, if indeed in some cases it cannot be increased.

The problem presented in these valleys is one common to all the lands on the lee side of the Waianae Range. This is naturally a dry district, with only a few permanent sources of water. Most of what there are are at best intermittent. But in view of the great need for water hereabout it is highly important that all possible sources of supply should be conserved and developed. As I have recently argued this point in a report on Nanakuli (dated August 9, 1912) it is unnecessary further to enlarge upon it here.

Unfortunately the native forest on the slopes at the upper ends of Makua and Keaau Valleys has suffered severely in the past both from stock grazing from below and from the ravages of wild goats from above. Through these agencies the former native forest was opened up and the undergrowth destroyed. In many places the old forest has now wholly disappeared.

The natural consequence is that the springs have dried up or have become very irregular in flow. With the restoration, as far as is now possible, of the original forest conditions it seems to me reasonable to expect an improvement in the local water situation.

Naturally the first step in such a program is to clear the slopes of cattle and to get rid of the goats. A start has been made in the latter particular by the hunting that has gone on at intervals at Makua. Systematically followed up it ought now to be possible at reasonable expense practically to exterminate the goats in this section.

With the construction of several comparatively short stretches of fence between natural barriers across several of the lateral valleys cattle can be excluded from the mauka section. It is not necessary that the whole forest line be fenced; certain portions only will be sufficient.

Where there are still groups of trees left to furnish seed, the native forest ought gradually to come back naturally. It goes without saying that could the process be assisted results could be hoped for much earlier than where nature is left to take her own course. On the lower slopes of all the valleys the Algaroba is spreading rapidly. It will soon form a cover, at any rate up to an elevation of from 800 to 1000 feet. The principal purpose of this Forest Reserve is to help in getting back the native Hawaiian forest at the heads of the valleys where are most of the water heads.

The forest line across these lands was first laid out some five years ago. This last spring the section across Makua was slightly modified to facilitate fencing. As has already been said the lease of Makua carries a fencing clause. The lower part of Keaau has been cut up and sold as homesteads. It is required that the mauka

line of the top lots be fenced. Up to a few months ago no fencing had been made, but the time is not up for another year.

The Makua Forest Reserve project has been pending for a considerable time, one reason for the delay in getting final action on it being that it was expected to include all the forest lands on the Waianae hills in one reserve, and Makua was held up awaiting action on other tracts. It has lately been decided to set apart several smaller forest reserves, separately.

Based on the reasons herein set forth, I do now recommend that the Board approve as the Makua-Keaau Forest Reserve the area covered by the technical description which accompanies this report, and that the Governor of the Territory be called upon to hold the required hearing and thereafter to create this reserve and set apart as portions of it the government lands within its bounds.

[The technical description of boundary, prepared as C. S. F. No. 2396 by the Territorial Survey Office, is here omitted, as it will be published later in the Forester as a part of the proclamation of the Makua-Keaau Forest Reserve.]

Very respectfully,

RALPH S. HOSMER,  
Superintendent of Forestry.

KUAOKALA FOREST RESERVE.

September 9, 1912.

Committee on Forestry. Board of Commissioners of Agriculture and Forestry, Honolulu, Hawaii.

GENTLEMEN:—The following report recommending the setting apart as a forest reserve of a portion of the government land of Kaena, Kuaokala Mountain, District of Waialua, Island of Oahu, is respectfully submitted for your consideration.

The area proposed to be set apart is situated on the upland plateau mauka of Kaena Point at the western extremity of the Waianae Range. It includes part of the government lands of Kuaokala, District of Waialua and Kaawaula (government), District of Waianae. Both lands are now under lease to Mr. L. L. McCandless, respectively Leases No. 739 (expiring Jan. 1, 1916) and 730 (expiring February 21, 1920). The total area of the proposed Kuaokala Forest Reserve is 434 acres.

Kuaokala consists of a gently sloping upland, much cut up by lateral valleys, most of which run toward the north. It is cut off from the low lands along the shore by a steep pali and is only accessible over rough trails. The approximate elevation of the mauka part of the upland is from 1400 to 1500 feet. The land has been used for a long time for grazing cattle. Of late years, at any rate, it has been but comparatively lightly stocked.

The purpose in proposing the reservation of a part of Kuaokala for forestry is to secure protection for a water head that locally

is of high importance, near the upper end of one of the main branches of Manini Gulch. Here, a little above a dairy house built by the late Sam Andrews, a tunnel has been dug from which a comparatively small but constant flow is secured. When I was there in February last it was estimated that the flow was about 2000 gallons.

In the valley above the tunnel is a fair stand of Kukui trees. Further mauka, on the ridge between the head of this valley and the small basin at the head of Keekee Gulch, "Malokea," there is Ohia Lehua, with other trees and native vegetation. In the adjoining Kaluakauila Gulch, that runs to the south, is a fairly heavy stand of forest.

The slopes of the small valleys on Kuaokala are not steep enough to serve as natural barriers; neither are they first class grazing land. While the area of the reserve is 434 acres, I should say that all but about 100 acres could be spared from the grazing area without material inconvenience.

A number of the ridges between the gulches named show the results of goat work, which has started erosion. Goats are said now to have been pretty well driven off Kuaokala through continued hunting.

The main trouble at Kuaokala is the cost of fencing, and to be effective this forest reserve must be fenced. It is a difficult place to which to bring material. There are no posts to be cut locally. The expense will necessarily be high. About 10,000 feet of fence would be required, from the corner of the boundary fence near Puu Hakakoa, along the north side of the proposed reserve and across the Manini Gulch at the tunnel above Andrews' old house. The boundary on the south side follows an old fence line on which the posts are for the most part still available for use and some of the wire. This old fence runs to a pali beyond which, to the east, except perhaps for one short stretch, the boundary follows a ridge where fencing is unnecessary. I understand that there are a good many more posts along the line of this old fence for a way toward Kaena point, that might be utilized in building the fence line along the proposed forest reserve. Under the provisions of Lease 739 a fence must be built on the forest reserve line within one year from the date of the proclamation of the reserve.

Based on the contention that the water on Kuaokala is of sufficient importance to warrant that somewhat expensive measures be taken to safeguard its apparent source, I do now recommend that the Board approve as the Kuaokala Forest Reserve the area described in the following paragraphs, and that the Governor be requested, after the required hearing has been held, so as to set apart the land, in accordance with law.

[The Survey Department's description (C. B. F. Number 2364)]



is here omitted as it will later be published in the Forester as a part of the proclamation of this Reserve.]

Very respectfully,

RALPH S. HOSMER,  
Superintendent of Forestry.

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## DIVISION OF ANIMAL INDUSTRY.

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Honolulu, June 4, 1913.

Hon. W. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry.

SIR:—I have the honor to report on the work of this Division for the month of May, 1913, as follows:

### *Honolulu Quarantine Station.*

All of the pens and enclosures have now been finished so that they may be said to be in perfect order and it is believed much stronger than they ever were before.

The sanding of all parts of posts, gates and plates that are at all exposed from the teeth of horses and mules has proven absolutely effective in preventing the animals from biting them.

A gate has been cut in the solid board fence leading into the glanders division and an alleyway built from this gate to the testing chute so that animals arriving and leaving may be taken through this chute to have halters removed or replaced without, as hitherto, having taken them out on the road and risking their escape.

The concrete work in the dog division is well under way, though work has had to be temporarily suspended on account of the rainy weather.

### *Hilo Quarantine Station.*

Dr. Elliot reports that work on this Station has been started, and he requests that the caretaker be appointed at the earliest possible date in order that he may put him to work on the macadamizing in the shelter sheds, which it became necessary to cut out of the specifications for lack of funds. He states that there is plenty of rock available which this man can gather and use as a foundation on which small crushed rock can later be placed.

### *Cerebro Spinal Meningitis.*

As was expected this disease has made its appearance following the recent rains, and it is possible that severe losses will occur

in the sections where this disease is known to recur annually. It has already been reported from both Molokai and Maui, and a new outbreak among the Government mules at Fort Shafter indicates that the disease may even be looked for from places where it has never been known to occur before. Four fine mules were taken with the disease during the middle and latter part of last week, and in the course of four or five days every one was dead in spite of the efforts of the military veterinarians as well as myself to relieve their suffering.

The true nature of this disease is absolutely unknown even though no other epidemic has been given so much attention as this one during the past year when it is estimated that the loss in the United States amounted to between 50,000 to 60,000 head during the month of August and September alone. The disease is supposed by some investigators to be caused by a molded or musty feed, while others are inclined to consider it as an infectious disease.

### *Hog Cholera.*

This disease, which has hitherto occurred in these Islands only in an extremely mild form, seems of late to have gained in virulence, and considerable losses have been reported, especially in this city and vicinity. It is estimated that more than 1,000 hogs have died and the disease seems to be spreading steadily. The latest form of treatment for this disease consists in the hypodermic injection of blood serum taken from animals which have recovered from the disease, but this treatment is both expensive and difficult to apply. The price of treatment for a full grown hog ranges from \$1.50 to \$2.00, while smaller animals may be treated for from 50 cents to \$1.00. A detailed statement of what has been done in this line will be found in the appended report of the Assistant Territorial Veterinarian.

### *Tuberculosis Control Work.*

The regular annual test of all dairy cattle in the County has now been started. As authorized by the Board the services of Mr. Joe Richards, formerly City Milk Inspector, have been secured and the work is now being systematized in such a way that all herds may be tested with as little inconvenience to the owners as possible.

Very respectfully,

VICTOR A. NORGAARD,  
Territorial Veterinarian.

## REPORT OF ASSISTANT VETERINARIAN.

Honolulu, June 4, 1913.

Dr. V. A. Norgaard, Chief of Division of Animal Industry.

SIR:—I hereby submit the following report for the month of May, 1913:

*Tuberculosis Control.*

No testing has been done this past month due to the lack of transportation and an assistant. The services of Mr. Joseph Richards, one time City and County Milk Inspector, have been obtained for this Division by the Board of Commissioners, and in a day or two the necessary repairs to the machine will be completed when we can again start on this important work. The test this year, which is the fourth general test of the dairies in the City and County, should total close to 6,000 head of cattle.

*Hog Cholera.*

Several outbreaks of Hog Cholera have occurred during the past month in which the disease has assumed a greater virulence than has been experienced before in this Territory, and the resultant loss has been very heavy in some districts. Until recently Hog Cholera has never taken a prominent place in the list of diseases affecting live stock in this Territory. Assuming a very mild type it has been easily controlled by strict sanitation and prophylactic measures in the diet and care of the animals. Now, however, such measures seem to be of little avail and in order to control and entirely eradicate this disease an entirely different line of treatment has been inaugurated.

The treatment now being followed consists of subcutaneous injections of anti-hog cholera serum. This produces a passive immunity lasting from five to six months and enables the animals to successfully pass through an outbreak of the disease. We feel confident that we can by this means materially reduce the losses from this disease and keep it under control.

On the 22nd of May a valuable herd of twenty-seven (27) hogs owned by the College of Hawaii were given subcutaneous injections of anti-hog cholera serum varying in amounts from 10 to 50 cc. according to the size of the animals. A short time before the treatment was applied it had been reported at this office that hog cholera had broken out in this herd with the loss of two animals. Serum was immediately cabled for and upon arrival the remaining animals were at once treated. Since then no deaths have occurred and temporary immunity to the disease has been established.

Great care is necessary to prevent abscess formation at the point of injection. Thorough disinfection and clean surface are absolute requirements; 5 per cent. carbolic acid or a strong solution

of creoline or chloronaphtholeum; scrubbing brush and sponge are all that is needed to prepare the site for the inoculation. The point of injection is usually the inner surface of the thigh, the one exception to this being sows heavy in pig and which have to be handled with great care to prevent abortion. In such animals the serum is injected behind the ear.

### *Importations of Live Stock.*

The following steamers have been boarded and the following live stock inspected and admitted to the Territory during the past month. Nineteen steamers have been boarded, nine of which were found carrying live stock as follows:

May 6—S. S. Lurline, San Francisco 26 mules, Schuman Carriage Company.

May 9—S. S. Mongolia, San Francisco: 1 crate chickens, 1 crate (2) Angora cats, A. W. Pavo.

May 12—S. S. Ventura, San Francisco: 2 crates chickens.

May 13—S. S. Hilonian, Seattle: 6 Angus bulls, Maui Agricultural Company.

May 13—S. S. Wilhelmina, San Francisco: 11 crates poultry; 1 dog, Capt. Winne.

May 19—S. S. Honolulu, San Francisco: 21 mules, Schuman Carriage Co.; 13 horses, Hawaiian Dredging Company; 2 horses, Capt. Holbrook; 1 dog, T. A. Montgomery; 23 crates poultry.

May 26—S. S. Sierra, San Francisco: 30 crates poultry; 1 dog, A. B. Camp.

May 26—S. S. Mexican, Seattle: 24 horses, Chas. Bellina.

May 26—S. S. Siberia, Orient: 1 dog, J. B. Reutiers.

Respectfully submitted,

L. N. CASE,  
Assistant Territorial Veterinarian.

### DIVISION OF ENTOMOLOGY.

Honolulu, May 31, 1913.

Board of Commissioners of Agriculture and Forestry, Honolulu.

GENTLEMEN:—I respectfully submit my report of the work of the Division of Entomology for the month of May, as follows:

During the month 40 vessels arrived at the Port of Honolulu of which 24 carried vegetable matter and 1 moulding sand.

<i>Disposal</i>	<i>Lots</i>	<i>Parcels</i>
Passed as free from pests.....	677	13,222
Fumigated . . . . .	9	424
Burned . . . . .	48	65
Returned . . . . .	1	1
Total inspected . . . . .	735	13,712

Of these shipments 13,274 packages came as freight, 117 packages in the U. S. mail and 321 packages in baggage of passengers.

### *Rice.*

During the month the following shipments of rice arrived:

From Japan 19, 704 bags.

From China, 1,400 bags, 500 mats.

Of this lot 300 bags of rice were found infested with the rice moth (*Paralepia modesta*). We compelled the consignee to fumigate the shipment under our supervision and at his own expense. All the other shipments were found free from pests and were allowed to be delivered.

### *Pests Intercepted.*

Thirty-eight packages of fruit and 24 packages of vegetables were found in the baggage of passengers and immigrants from the Orient. These were all seized and destroyed.

In a shipment of seeds from Manila we found two seed weevils (*Araecoccus species* and *Cryptorhynchus species*). The latter species would no doubt cause considerable damage to large seed pods in the Territory as it is closely allied to the Mango weevil (*Cryptorhynchus mangiferae*) which attacks the seeds of the mango and causes decay and premature dropping of the fruit.

On a shipment of Orchids we found Mealybugs (*Pseudococcus citri*) and the Purple scale (*Lepidosaphes beckii*); also the larvae of the Orchid borer (*Acythocephus aterrimus*). After fumigation each orchid was gone over carefully and all those infested were rejected.

In soil from Japan we found the pupa and larva of a large fly (*Ptecticus species*). This insect is closely allied to one of our decay flies so commonly found in over ripe bananas and vegetables.

### *Hilo Inspection.*

Brother M. Newell reports the arrival of eight steamers and two sailing vessels. Five of the steamers brought vegetable matter consisting of 115 lots and 2381 packages. After all celery, carrots and beets had been washed they were allowed to be delivered. One sailing vessel had soil as ballast which was dumped at sea.

### *Beneficial Insects.*

Owing to the abundance of the Japanese beetle many parties have brought live beetles for inoculation and 26 lots of inoculated beetles have been sent out during the month.

*Inter-Island Inspection.*

During the month of May 68 steamers were attended to and the following shipments were passed:

Plants . . . . .	65 packages
Taro . . . . .	738 bags
Fruit . . . . .	16 packages
Sugar cane (plants) . . . . .	400 cases
Lily root . . . . .	12 packages
Cocoanuts (sprouting) . . . . .	10

Total passed . . . . . 1241 packages

The following packages were refused shipment:

Fruit . . . . .	16 packages
Plants, rejected on account of soil . . . . .	21 "
Vegetables, rejected on account of soil . . . . .	4 "

Total refused shipment . . . . . 41 packages

Respectfully submitted,

E. M. EHRHORN,  
Superintendent of Entomology.

## DIVISION OF FORESTRY.

Honolulu, May 31, 1913.

The Board of Commissioners of Agriculture and Forestry.

GENTLEMEN:—I have the honor to submit as follows the routine report of the Division of Forestry for May, 1913:

*Forest Reserve Matters.*

During the month I made an inspection trip of five days to the Island of Kauai to look into questions of fence building on forest reserve boundaries above Lihue, Kealia and Moloaa. Earlier in the month, in company with the Governor, the Land Commissioner and the Surveyor, I visited the land of Hauula in reference to the forest boundary across that land, and on another day made an inspection of certain water developments in the Pupukea Forest Reserve.

Not a little of my time during May was spent in attending to details in regard to two proposed forest reserves on the Island

of Hawaii and one on Oahu. As soon as the official descriptions are received these projects will be submitted to the Board.

On May 31, the Governor and members of the Board held a public hearing at the Government Nursery to consider setting apart three tracts, mainly of Government land, in the Waianae District, Oahu, as forest reserves. The lands are the upper portions of the valleys of Makua-Keaau 4716 acres, Nanakuli 1010 acres, and the Makua part of the land of Kuaokala 434 acres. In all 6160 acres, of which only 340 acres (a fee simple land in Keaau valley) is in private ownership. No one appeared at the hearing in opposition to the creation of these reserves.

### *Forest Fire.*

While on Kauai I learned of a small grass and brush fire that had occurred on or about May 20, on land immediately above the mauka Kapaa homesteads. The fire got away from a homesteader who was clearing land, but fortunately did not spread far. Ten to fifteen acres were estimated to have been burned over.

### *Improvements at Government Nursery.*

Within the past few weeks a number of changes have been made in the arrangement of the stable sheds at the Government Nursery and in the shifting of location of the insectaries and other smaller buildings. When completed these modifications will add much to the convenience and usefulness of the service buildings.

### *Federal Assistance in Experimental Tree Planting.*

The Federal Forest Service has informed me that for the fiscal year beginning July 1, 1913, the sum of \$200 will be allotted to Hawaii for use in continuing experimental forest planting work now in progress. This money will be used in getting the plantation of Eucalyptus in Nuuanu Valley well established and in planting out on Haleakala and Mauna Kea seedling trees now being held in Ranch Nurseries on those mountains.

### *Nursery Report.*

As usual the report of the Forest Nurseryman is transmitted herewith.

Very respectfully,

RALPH S. HOSMER,  
Superintendent of Forestry.

## REPORT OF FOREST NURSERYMAN.

Honolulu, May 31, 1913.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir:—The following is a report of the work done during the month of May, 1913:

*Nursery.**Distribution of Plants.*

	In seed boxes	In boxes transplanted	Pot grown	Total
Sold . . . . .	.....	150	112	262
Gratis . . . . .	3000	...	881	3881
	3000	150	993	4143

*Collections.*

Collections on account of plants sold amounted to.....	\$ 3.75
Rent of building, nursery grounds.....	35.00
Total . . . . .	\$38.75

The men at the Nursery have been assisting the carpenters and plumbers in the work of repairing and making additions to the buildings.

Coöperating by request of the Outdoor Circle of the Kilohana Art League, a commencement has been made to plant the center plat of Kalakaua Avenue with Mahogany trees. The seed from which the trees were raised was sent to us by Mr. Gerrit P. Wilder when on a tour about two years ago. The trees were propagated at our Makiki station.

*Plantation Companies and Other Corporations.*

The distribution of trees during the month amounted to 16,000 in seed boxes and 1000 in transplant boxes. Total, 17,000.

Orders have been received for 4000 transplants to be delivered when ready.

*Experimental Garden, Makiki.*

The new soil sterilizer has been delivered and we expect to have it running in a few days. Other work done has been the regular routine work, potting and transplanting trees.



*U. S. Experiment Planting, Nuuanu Valley.*

The man has been transplanting new varieties of Eucalyptus into tin cans and hoeing around the small trees that still require a little attention.

Very truly yours,

DAVID HAUGHS,  
Forest Nurseryman.

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*THE COÖPERATIVE CREDIT MOVEMENT.*

*(The Tropical Agriculturist.)*

PROGRESS IN NATAL.

The more we come to study the rural conditions of Natal the more we are struck with the enterprise, the energy and the intelligence of the farmers of this province. Take, for instance, the extraordinary progress of the Agricultural Cooperative Union. It stands a splendid example of self-help and sturdy self-reliance of a society which scorns State aid. The name of the secretary, James Erskine Duff, seems to remind us of a Scottish Covenanter resurrected in the twentieth century to stir the dry bones of those colonists who live in this dream-like, lotus land. The Co-operative Union was started three years ago. It was formed by the amalgamation of the Wattle Bark Union and the Mealie Union. The membership is now over 900, and the annual turnover a quarter of a million sterling. To become a member the farmer must take up £5 shares either in one amount or at the rate of 10s. per annum spread over ten years. The idea is a limited liability company. The president of the union is Sir Thomas Hyslop, and there are three committees—for wattles, for mealies, for live stock. Take the matter of commercial manures, such as superphosphate, bonedust, basic slag and mealie fertilizer, all of which are largely used in Natal. The secretary calls for tenders, say, 4000 tons per annum. Naturally, such a quantity can be bought at a much cheaper rate than a small amount by a single individual. At the commencement of the season superphosphate was sold at £4 per ton to the ordinary farmer, whereas the Union member only paid £3 7s. 6d. per ton. The ordinary man pays 13s. to 14s. per bag of seed oats (150 lb); the Union member can get it for 12s. Formerly the cost of arsenite of soda used for dipping was £3 5s. per cwt. Through the efforts of this society it can now be purchased from the merchant at £1 5s. per cwt. The terms of the Union are cash on delivery, but there is also a system called the credit association. This means

that three or four members can club together and guarantee their own accounts if approved by the committee, up to twelve months' credit at 8 per cent. interest. This is the buying side of the business. Now as to the selling. The Union has sold this year 60,000 bags of mealies for members at prices ranging from 10s. to 20s. per bag. The members are under no compulsion to buy or sell with the Union. But they realize that the Union saves them much time and trouble and obtains the highest prices. To the up-country farmer the Union is of special value. Take the case of wattle bark. The Union has agents in London and Hamburg, makes contracts and ships direct. The other day a member received £1 per ton above the local market price in Durban. A form is sent out to all the members. They guarantee to supply a stated quantity of bark per month. With this knowledge the Union committee can watch the market and so secure the best price. The individual dealer in Durban does not know what quantity of bark he may have on hand month by month, and, consequently, he cannot offer as favorable terms. The Union also imports pedigreed stock, purchases fencing material, publishes a weekly agricultural gazette which is issued free of charge to every member, and now proposes to insure live stock of every description. It is another illustration of the advantage of friendly coöperation in modern farming. The day of isolation, suspicion and farm secrets is dead. The success of a nation is not measured by the fortunes of a few, but by the prosperity of every citizen.—*The Agricultural Journal of the Union of South Africa.*

#### IN THE PUNJAB.

We recently directed attention to the inestimable benefits conferred upon the agriculturists of the Punjab by the extension of the coöperative credit system in that province. There has just been issued from the government press a statement which shows how rapid has been the growth of this beneficent movement throughout India. In the five years from 1906-07 to 1911-12 the number of societies, central, urban and rural, rose from 843 to 8177 and the total membership from 90,844 to 403,318. The increase in the financial resources of the societies was even more marked. In the first of the years named the capital available, including loans from private persons and from other societies, share capital deposits by members, and State aid aggregated Rs. 23¾ lakhs. By 1910-11 the total had gone up to Rs. 230½ lakhs, while at the end of the past financial year it had still further increased to Rs. 337¾ lakhs.—*Indian Agriculturist.*

#### CO-OPERATION IN DENMARK.

The November issue of "Denmark Abroad," a monthly review, contains a lengthy article on the Danish Credit Societies by M. P.

Blen, President of the Credit Society of Estate Owners in the Danish Island Diocese-Districts. The principle works, as will be known, on the cooperative system.

A society of land-owners formed by debtors with the object of borrowing money jointly. It mints its own money according to the daily requirements, in the shape of treasury bonds, on which interest and instalments are to be paid with mortgage security in fixed property—under unlimited responsibility and with a reserve fund as an auxiliary support.

Sixty to seventy years ago there was an upward tendency in the financial condition, but money was scarce. It was almost impossible to procure mortgages, especially on farming properties, and many private persons possessing money dared not lend it out, even against the finest mortgage security. It is gratifying to know that credit societies, which act as a link between borrower and lender, remedied this disagreement. Their treasury bonds became the means of transaction, the means of credit and the substitute for missing money.

### PLANTING COCOA.

The following notes have been contributed by Mr. A. H. Hoare to the *Journal of the Jamaica Agricultural Society* of December, 1912:

The young cocoa plants will succeed best if planted out through bananas, as they must have a certain amount of shade from the hot sun when young and the banana will answer satisfactorily for that purpose and enable the cocoa to be grown economically. Moreover, if the bananas have been properly cultivated the land will be already in good condition and will need no further preparation before planting. See that the land is properly drained, especially if it is inclined to be wet or if it is of a stiff clayey texture, otherwise the soil becomes in wet weather sodden and sour, and cocoa trees will not thrive when the soil is water-logged and sour. Choose land that has a good soil, deep because the trees send down a tap-root which although not assisting to feed the tree to any great extent, will greatly affect its health if it comes into contact with an impenetrable bed of marl or rock.

Avoid bleak, windy situations, for cocoa trees love shelter and suffer greatly from the effects of strong winds which cause defoliation and also injury to the tender young shoots. Valleys sheltered by hills and rocks, and stretches of land protected by good belts of timber are ideal situations if in a good rainfall.

Do not follow the examples of others and plant too close, for cocoa trees need light and air in abundance, and will never pay for over-crowding. On good rich land I would advise planting 12 to 14 feet apart in the rows and on poorer soils or on hillsides

where the trees will not grow so big 11 to 12 feet apart will not be too close. At these distances the trees should almost touch when fully grown and there will be ample space for the free circulation of light and air so needful for healthy growth of the trees and full crops of pods. In addition, the trees will shade the ground nicely, keeping it cool and moist and also preventing an excessive growth of weeds. Of course, the distance between the rows will depend on what distance the bananas are planted, as the row of cocoa trees will run between each row of bananas.

First, line out the rows methodically, and place a peg where each hole is to be dug. Large holes should always be dug to receive the plants, and I strongly urge the digging of them about not less than a fortnight to three weeks before planting. Good holes are important. They should be made at least two feet square and eighteen inches deep and the soil must be well turned out so as to expose both soil and hole to the beneficial action of sun and air. Then, just a few days before planting, fill in the hole with good surface soil, making its surface a little higher than the surrounding land to allow for sinkage. Unless this precaution is taken, when the ground sinks there will be a depression round the plant in which water will settle and cause the stem to rot away.

#### TRANSPLANTING.

When putting out plants grown in bamboo pots, great care must be used so that the plant shall receive as slight a check as possible in transplanting. Take care to see that the soil in the pot is well soaked before removing the plants. I advise placing them for a few minutes in a pail of water to soak and standing them aside to drain. When actually planting, the pot should be taken into the hand and carefully split open by making a cut at each side with a cutlass. Next, neatly reverse the two halves of the pot, make a good hole in the loosened soil with the hand and insert both pot and plant carefully. Do not plant too deep or too shallow, but sink the pot until its top is level with the surface, pressing in the soil around it. Then gently withdraw the two reversed halves of the pot, making everything quite firm and tidy afterwards.

The great advantage of preparing a good deep hole and careful planting is very soon apparent, for the plant makes a good start in the sweet loosened soil and grows away at a vigorous rate. One cannot too heartily condemn the slip-shod method often adopted of simply chopping a hole with the hoe, pushing in the plant with perhaps all the soil shaken off its roots, and then leaving it to take its chance. It is hardly to be wondered at that most of the plants, instead of progressing, gradually die out until the cultivator who put out a hundred plants eventually finds that he has only a dozen or so growing plants left. By following this

simple but very safe method, every plant should grow and in a few years form a uniform and profitable plantation.

In conclusion, I might mention the time-saving plan of always keeping back a few plants in pots so that in the event of any dying out, they can be renewed at once.

### MANURING TREES.

It may seem a simple thing to manure a tree, yet the great majority of people who take to the idea of helping their trees with some manure, dump a heap against the trees. The majority, of course, do not manure their trees except by accident, expecting the soil to give crops out of good nature without assistance. Bananas are commonly treated thus, but the effect on such, being herbaceous plants, is to bring out roots high up, which when the heap of manure decays down are left dry and so are wasted. But on many trees, like orange and cocoa, the effect of a heap of manure placed against them is injurious. The most vital parts of such trees is the neck, that part where the roots start from the stem. The manure softens and tends to rot the bark there, encourage insects and grubs to attack the bark, while manure there can do no possible good. Trees take up their food material from all those little fine roots that start off from the large roots, and which are especially plentiful at the very end of the roots. And it is where these fine roots are that the manure should be placed, preferably in light open soils by spreading it as a mulch, and in heavy clay soils by digging the manure in and mixing it with the soil.

In mulching also, which is only a form of manuring, the mulch should not be put close to the banana, cocoa, coffee or coconut tree root; a clear circle should be left close to the stem.—*The Tropical Agriculturist*.

### DRY ROT OF THE IRISH POTATO.

The Nebraska Experiment Station has just issued Bulletin 134, on "A Dry Rot of the Irish Potato Tuber."

For several years the department of Agricultural Botany has been engaged in a study of Irish potato diseases in Nebraska. Among these the dry rot of the tuber is one of the most important. Buyers and commission men have reported losses, during storage, of from 20 to 60 per cent. due to this dry rot. In fact, the most important feature of this dry rot is the fact that it forces the immediate sale of the crop as soon as dug. This tends to demoralize the market and places the grower at the mercy of the buyers, since he is himself afraid to store his crop and wait for better prices.

## SYMPTOMS.

The dry rot here described is a strict tuber rot affecting mature tubers only. Neither the stems nor the young tubers are ordinarily in the least affected. Natural infection is known to occur solely through wounds produced in the process of digging or subsequent handling. In many cases this rot secured a foothold through wounds produced by scab-producing animals of certain sorts and perhaps even through scab spots due to fungus parasitism, though the latter method is certainly very rare if we may judge from the laboratory experiments.

The rotting is rather slow, and in general within four to six weeks from one-third to three-fourths of the tuber is destroyed. The epidermis of the rotted portion becomes slightly wrinkled and usually has a characteristic bluish color. On account of the rapid destruction of the underlying tissues the surface over these areas soon becomes distinctly depressed.

The rot may make its appearance at any point on the surface of the tuber, though more commonly perhaps at the bud end of the tuber. There is no watery degeneration of the tuber unless other organisms gain entrance, so that this is in fact a dry rot.

## CAUSE.

Numerous inoculation experiments have shown that this dry rot is caused by a parasitic fungus, not previously described, for which we have proposed the name *Fusarium tuberivorum*. At the same time it has also been demonstrated that this dry rot fungus does not cause the injury to the leaves and stems often referred to as "blight" or "wilt." In other words, the present dry rot of the tuber is not connected in any manner with diseased conditions of other parts of the plant.

## METHODS OF CONTROL.

Extensive experiments have been conducted to learn if any treatment might be applied before the potatoes were stored that would reduce the amount of this rotting.

These experiments have clearly demonstrated that dry rot may be held in check through treatment of the tubers before being placed in the storage cellars. For this purpose the best results were secured through the use of either formalin dip, formalin vapor, or the lime-sulphur wash. Not only did the tubers in these lots show a very small percentage of dry rot, but they were in excellent condition otherwise when removed in April. The storage time, it should be remembered, employed in this experiment is longer than would ordinarily be employed by the average farmer and this gave the treatments a severe test. Under ordinary farm conditions the development of the formalin vapors is

not easily secured, and therefore we would particularly recommend the use of the formalin dip as the easiest method to employ and one that should give excellent results in practice.

Anyone directly or indirectly interested in potato growing should make it a point to read this bulletin. It may be had free of cost by the residents of Nebraska on application to the Nebraska Experiment Station, Lincoln, Nebraska.

E. A. BURNETT,  
Director.

### THE DAIRY COW.

A cow requires food whether she is milking or not. The amount of food necessary to maintain a dry cow in fair condition, so that she will neither lose nor gain in weight, represents what is called her "maintenance requirement." The maintenance requirement of healthy cows of similar weight does not vary much. If a cow is milking, however, she must consume and digest food in excess of her maintenance requirement. Otherwise she will lose in weight. The food consumed by a cow yielding milk is thus utilized for two different purposes. One part is required for maintenance, and this may be set down as working expenses. The other part is utilized to fill the milk-pail—it is the raw material from which milk is produced. What is a good cow? It is one which can digest and assimilate for milk production an amount of food which largely exceeds her maintenance requirement. But cows vary widely in this respect. From the University of Missouri there comes an interesting discussion of this topic in *Experimental Station Bulletin No. 2*. During two years the herd-testing at the station showed No. 27 cow to be a good milker, and her half-sister, No. 62, a bad one. They were registered Jerseys. In the third year it was decided to compare the food requirements of these cows, and for this purpose both were calved, as it happened, the same week. During the lactation period the food to each was regulated so that the live-weights remained constant, and the amounts of milk and butter fat were then compared with the amounts of food consumed by each cow. In the results it was found that the good milker was consuming about  $2\frac{1}{2}$  times as much food, after deducting her maintenance requirements, as did the bad cow, and she also produced about  $2\frac{1}{2}$  times as much milk. Altogether, with the good cow, 35 per cent. of the ration went for maintenance and 65 for milk; with the bad one the figures were 56 and 44. Ten bad cows may yield as much milk as five good ones, but they will require twice as much food for maintenance purposes. As it is only the food utilized in excess of maintenance that leaves a

profit, the benefits of herd-testing are hereby emphasized—Victoria (Australia) *Journal of Agriculture*.

### NEW WEED EXTERMINATOR.

Wild garlic (*Allium vineale*) has for many years been a serious pest in that belt of territory which extends from Maryland to Missouri. Besides having the usual competitive action of a perennial weed, the plant is harmful in that the bulbils on the stem frequently get intermixed with wheat grain and create an objectionable flavor in the flour. As a weed with fodder crops, this plant may have an effect in causing the tainting of milk.

Considerable attention, therefore, has been directed by the Botanical Department of the Indiana Experiment Station, towards methods for eradicating this noxious weed. A letter in *Science*, for January 3, 1913, states that remarkable results have been obtained by the use of orchard-heating oil as supplied by the Standard Oil Company. It was found that when the oil was distributed over the field in a fine spray by a sufficiently powerful spraying machine, practically all vegetation was killed, not only above ground but below ground as well. It destroyed the bulbs of the wild garlic below ground and the bulbils at the top of the stalks. One or two plants with very large horizontal rootstocks survived, since these required a rather larger dose of oil than was generally applied.

The application of the oil appeared to have no lasting effects on the soil; the new growth from seeds already present in the soil and from subsequently sown cereals possessed the usual vigor.

In considering the trial of this method in the West Indies for exterminating perennial weeds like Devil's grass (*Cynodon Dactylon*) and Nut grass (*Cyperus* sp.) the following questions arise: (1) Will the oil actually kill the hardy rhizomes and tubers of these weeds? (2) Does the oil possess any injurious effect regarding the physical and biological characters of the soil? and (3) What would be the cost per acre?—*Agricultural News*.

### PAPER FROM BAMBOO.

Paper from the bamboo cane will soon, says the *Standard*, be of the usual order of things. Scottish engineers are mainly responsible for bringing about this new departure. Not long ago an Edinburgh firm, who specialize in the making of plant for producing paper from bamboo, sent out two complete factory equipments to the Far East—one to convert cane into pulp, and the other to transform that pulp into fine white paper.



On a site near Kagi (Japan) a factory is being installed with every requisite to deal in the first place with only 300 tons of pulp per month, but with room for any development. In this case, however, the pulp will be treated in Formosa, and shipped in rolls or sheets to the paper mills at Kobe; just in the same way as the wood pulp of Norway, Sweden, Russia and Finland is shipped to the United Kingdom to feed the British paper mills. Esparto grass gives way to wood pulp in this country for paper-making purposes, and it is hoped that in the Far East bamboo pulp will enable Eastern mills to compete with the British and American imported paper of the finer qualities. One thing has to be borne in mind—that the process of manufacture from bamboo is a more expensive one than that from wood. Meantime, at any rate, experiments may cheapen the process, and the supply of the cane is practically inexhaustible.

Furthermore, the bamboo is a plant that can readily be cultivated. If any particular species of bamboo is considered the best for paper-making purposes it can easily be grown in any quantity. Asia, Africa, America, and Oceania all have forests of that plant, and a very interesting process is the manufacture of the cane into paper. It is cut up into small pieces of one or two inches, then boiled with sulphate of lime, bleached by electricity, washed, machine rolled, and pressed into tissue form and dried by steam. When wound into rolls or sheets it has a pleasing appearance, and makes an excellent quality of paper.—*L. and C. Express.*

## GOATS.

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The goat industry is little known in the United States, but there is no sound reason why it should be so. On fifteen thousand square miles, Switzerland raises annually eight million dollars' worth of goats and goat products. America has all the essential conditions of Switzerland in her mountainous regions. In Bavaria, the number of centenarians among the people is noteworthy, and is credited to the fact that there is a large use of goat milk. This milk is very rich and highly digestible, and is recommended for invalids and babies. The goat, itself, is immune from tuberculosis, which is a mighty point in its favor. With millions of acres of brush land lying idle in this country, and with millions of babies clamoring for proper food, the milk-goat industry could doubtless assume monstrous proportions, if a love for the goat could be instilled into our people, especially in those living in mountainous regions.—*The Farmer's Guide.*

## ANCESTORS OF POLYPHEMUS.

Who does not know Polyphemus, the one-eyed giant shepherd of whom Homer has something to say in his *Odyssey*? How many of us take the fable in earnest and do not give Ulysses the lie?

But he did not lie. In the course of construction of a railroad in Asia Minor, in the region where Ulysses had his experiences, Italian engineers found giant human bones that could be the remains of none other than the Polyphemus tribe. If you doubt this, write a postal to Signor Antonio Blanco at Schio, Italy, the man who was in charge of the excavation.

Now a new corroboration comes from the Mayo Plantation at Mati, Moro Province, P. I. The acting manager of the plantation, Mr. George Kazdaylevich, who recently arrived at Zamboanga, and who, mind you, is a consistent teetotaler, relates that in the Mati forest a tribe of monkeys live, who are in direct line of descent with Polyphemus. They have only one eye, and it is located in the middle of the forehead. The witness, together with four other men, has seen one of them and tried to catch it, unfortunately without success. The monkey keeps strictly to the forest and jumps to the next tree as soon as he sees an enemy. The natives of the East Coast say they frequently see the one-eyed monkeys. Did they all see the same monkey, or are there really many?

Now the question arises: How could Polyphemus stray so far from his old country? Or is it that the Mati monkey has strayed far from Greece? We leave these deep scientific questions to the Bureau of Science.

Another interesting thing that Mr. Kazdaylevich brings with him is the seed of the Rosella (*Hibiscus Sorbifolia*) that he received from Mexico. While in that country he learned from the native Mexicans how to manufacture from this fruit a most delicious beverage that beggars Welsh's grape juice. Mr. Kazdaylevich is willing to supply seed to those desiring them, together with full instruction in the art of making the pleasing beverage.—Mindanao (P. I.) *Herald*.

## COMBATING CUTWORMS.

The poison bran mash is fairly effective in holding cutworms in check. Mix one pound of Paris green or London purple with 25 pounds of bran or middlings. Stir a quart or two of cheap molasses into a gallon of water, moisten the bran, stirring thoroughly until it makes a stiff mash. Apply a heaping teaspoonful near each plant or every two or three feet in the row. Keep fowls away. Apply two or three days before plants are set and apply

the mash in the evening so it will be eaten at night while moist.

It is said that garden plants may be protected from cutworms and flea-beetles by dipping the plants in arsenate of lead, three pounds per barrel of water. The plants are dipped in the solution just before they are transplanted.

Where the worms are very bad, sometimes gardeners knock the bottom out of tin cans and place these around such plants as cabbage, tomatoes, etc. A protection may also be made with building paper. The paper is bent into a cylinder and placed in the soil around the stems of the plants.

A plan that has been satisfactory with us is to take a lantern early in the evening, go into the garden and make war upon the worms with barrel stave or "paddle." The cutworms are usually on the surface or busy eating your plants. It does not take long in this way to destroy the pests in such numbers as to have no further trouble.—*Farm and Ranch*.

### NEW EGYPTIAN GRASS GOOD FOR CATTLE.

A late Washington despatch says: Sudan grass, a new drought resistant hay plant, promises to become the leading grass for hay production in the United States, according to C. V. Piper of the Department of Agriculture, who has supervised experimental growths.

The grass is a native of Egypt, suited especially to semi-arid land, grows from four to eight feet high and two to three crops a season. It is preferred by cattle, hogs and horses.

Roland McKee of the agricultural experiment station in Chico experimented with the new plant in 1912 and is enthusiastic concerning its value.

"A fine growth was made," he reports, "and without question this is the most promising grass for growing under irrigation in the Sacramento valley that has yet been tried. The number of cuttings of hay was not determined, as with both plantings a seed crop was allowed to mature, but it seems probable three good cuttings of hay can be made."

The seed was planted at Chico May 2 and two months later the grass was in full bloom and from four to six feet high. It was cut for hay July 15, nine weeks after planting. Reports from Texas, Virginia, North and South Dakota are equally encouraging.

## BY AUTHORITY.

**PROCLAMATION OF FOREST RESERVES IN THE DISTRICTS OF  
WAIANAE AND WAIALUA, CITY AND COUNTY OF HONO-  
LULU, ISLAND OF OAHU, TERRITORY OF HAWAII.**

Under and by virtue of the authority vested in me by the provisions of Chapter 28 of the Revised Laws of Hawaii, as amended by Act 65 of the Session Laws of 1905, and by Act 4 of the Session Laws of 1907, and of every other power me hereunto enabling, I WALTER F. FREAR, Governor of Hawaii, with the approval of a majority of the Board of Commissioners of Agriculture and Forestry, having held the hearing of which notice has been duly given as in said acts provided, do hereby recommend and approve as forest reserves to be called respectively the Nanakuli, the Makua-Keau and the Kuaokala Forest Reserves, those certain pieces of government and privately owned land in the Districts of Waianae and Waialua, Island of Oahu, which may be described roughly as being the upper ends of the valleys bearing those names and the mauka portion of the government land of Kuaokala, and containing respectively areas of 1010 acres, 4716 acres and 434 acres, more or less, in the Districts of Waianae and Waialua, City and County of Honolulu, Island of Oahu, Territory of Hawaii, more particularly described by and on maps made by the Government Survey Department of the Territory of Hawaii, which said maps are now on file in the said Survey Department marked respectively Government Survey Registered Maps No. 2535, "Nanakuli Forest Reserve," No. 2407 "Makua-Keau Forest Reserve," and No. 2532, "Kuaokala Forest Reserve," and descriptions accompanying the same, numbered respectively C. S. F. Nos. 2366, 2396 and 2364, which said descriptions now on file in the said Survey Department are as follows:

**NANAKULI FOREST RESERVE.**

**Waianae, Oahu.**

C. S. F. No. 2366.

Beginning at Government Survey Trig. Station "Manawahua" on the ridge separating the lands of Nanakuli and Honouliuli, as shown on Government Survey Registered Map No. 2535, and running by true azimuths:

1. Along down the ridge separating the lands of Nanakuli and Honouliuli to an iron pipe at the West corner of the proposed Honouliuli Forest Reserve the direct azimuth and distance being 67° 08' 4420.0 feet;
2. 231° 26' 30" 2179.0 feet along Nanakuli pasture land to a forest reserve monument on spur;
3. 202° 46' 1441.0 feet along Nanakuli pasture land to a pipe on ridge;
4. 144° 20' 1519.0 feet along Nanakuli pasture land to a forest reserve monument on ridge;
5. 97° 07' 1970.0 feet along Nanakuli pasture land to a pipe on end of spur;
6. 215° 02' 30" 2642.0 feet along Nanakuli pasture land to a pipe on end of spur;
7. 308° 19' 30" 1108.5 feet along Nanakuli pasture land to a forest reserve monument on spur;
8. 251° 24' 1784.7 feet along Nanakuli pasture land to a pipe on small spur;
9. 209° 14' 30" 1452.3 feet along Nanakuli pasture land to a pipe on small spur;
10. 224° 59' 1094.0 feet along Nanakuli pasture land to a forest reserve monument on small spur;

11. 132° 08' 30" 1018.0 feet along Nanakuli pasture land to a forest reserve monument on small spur;
12. 92° 49' 1118.1 feet along Nanakuli pasture land to a forest reserve monument on spur;
13. 145° 39' 2333.5 feet along Nanakuli pasture land to a pipe on small spur;
14. 85° 50' 30" 1267.5 feet along Nanakuli pasture land to a forest reserve monument on small spur;
15. 38° 09' 30" 1973.0 feet along Nanakuli pasture land to a forest reserve monument on spur;
16. 66° 43' 4786.0 feet along Nanakuli pasture land to Haleakala Peak on the ridge separating the lands of Nanakuli and Lualualei, said peak being the south corner of the Lualualei Forest Reserve;
17. Thence up along the ridge separating the lands of Nanakuli and Lualualei, along the Lualualei Forest Reserve, the direct azimuth and distance being 226° 58' 30" 6176.4 feet;
18. Thence still up along the ridge separating the lands of Nanakuli and Lualualei, along the Lualualei Forest Reserve, to a peak called Palikea, at the intersection of the ridges forming the boundaries of the lands of Lualualei, Nanakuli and Honouliuli, the direct azimuth and distance being 267° 10' 6280.0 feet;
19. Thence down along the ridge separating the lands of Nanakuli and Honouliuli, along the proposed Honouliuli forest reserve, the direct azimuth and distance being 350° 25' 4505.0 feet to a peak called Mauna Kapu;
20. Thence still down along the ridge separating the lands of Nanakuli and Honouliuli, along the proposed Honouliuli Forest Reserve, the direct azimuth and distance being 22° 31' 6219.0 feet to the point of beginning.  
Area 1010 acres.

#### MAKUA-KEAAU FOREST RESERVE.

##### District of Waianae, Island of Oahu.

C. S. F. No. 2396.

Beginning at a 1½ inch pipe at the base of pali on the boundary between Kaaau and Makaha, the coordinates of said pipe referred to Government Survey Trig. Station "Kepuhi" being 2278.5 feet North and 462.0 feet West, and the true azimuth to a + in coral rock at sea on the boundary between Kaaau and Makaha being 69° 58' distance 1263.7 feet, as shown on Government Survey Registered Map No. 2407, and running by true azimuths:

1. Along the base of the pali to a 1½ inch pipe on rocky ledge, the direct azimuth and distance being 192° 13' 2926.0 feet;
2. 170° 32' 1355.5 feet to a 1½ inch pipe on rocky point;
3. 219° 05' 911.7 feet to a 1½ inch pipe;
4. 178° 32' 976.7 feet to a 1½ inch pipe on rocky point;
5. 217° 46' 1314.5 feet to a + on solid rock;
6. 288° 16' 3693.0 feet to a 1½ inch pipe;
7. 270° 53' 1831.0 feet to a 1½ inch pipe;
8. 176° 25' 2766.0 feet across Kaaau Valley to a 1½ inch pipe;
9. 115° 40' 1302.5 feet across the land of Ohikilolo to a 1½ inch pipe;
10. 104° 43' 2210.0 feet to a 1½ inch pipe on spur;
11. 121° 50' 3861.0 feet to a 1½ inch pipe at the base of pali;
12. Thence along base of pali crossing Ohikilolo-Makua boundary to a 1½ inch pipe on spur in Makua Valley, the direct azimuth and distance being, 196° 42' 2116.0 feet;
13. 288° 00' 3931.3 feet to a 1½ inch pipe at small pali at end of fence;

14. Thence along fence and wall, the direct azimuth and distance being 179° 46' 915.0 feet;
  15. 247° 37' 346.0 feet on spur to a 1½ inch pipe;
  16. 274° 40' 5032.8 feet to a 1½ inch pipe;
  17. 259° 46' 30" 880.3 feet to a 1½ inch pipe;
  18. 202° 26' 3811.1 feet across Makua Valley to a 1½ inch pipe;
  19. 72° 00' 2237.2 feet to a 1½ inch pipe;
  20. 104° 06' 30" 5471.3 feet to a 1½ inch pipe on spur, being the boundary between Makua and Kahanahaiki;
  21. 204° 00' 2645.5 feet to a + on large solid rock;
  22. 158° 34' 1786.5 feet to a 1½ inch pipe on small spur;
  23. 70° 11' 30" 2632.0 feet to a 1½ inch pipe on spur;
  24. 70° 50' 2774.5 feet to a 1½ inch pipe on pali point;
  25. Thence across Kahanahaiki along the base of pali to a + on solid rock on the boundary between Keawaula and Kahanahaiki, the direct azimuth and distance being: 135° 33' 3868.0 feet;
  26. Thence up center of ridge along Keawaula, and thence along center of the main Waianae Range along Kuaokala, Kealia, Kawaihapai, and Mokuleia, to the junction of the Makua, Mokuleia, and Makaha boundaries, the direct azimuth and distance being: 295° 00' 23320.0 feet;
  27. Thence down center of ridge dividing Makaha and Keaa to the point of beginning, the direct azimuth and distance being: 55° 12' 21480.0 feet;
- Total area 4716 acres.

#### KUAOKALA FOREST RESERVE.

#### Waialua District, Island of Oahu.

C. S. F. No. 2364.

C. S. R. Map No. 2532.

Beginning at Government Survey Trig. Station "Hakakoa" and running by true azimuths:

1. 169° 50' 711.5 feet along government land to fence corner;
2. 80° 14' 1927.5 feet along government land;
3. 62° 43' 30" 798.8 feet along government land to a 1 inch iron pin;
4. 132° 22' 30" 1194.2 feet along government land to a 3 x 3 redwood post;
5. 121° 26' 1727.4 feet along government land to a 3 x 3 redwood post;
6. 125° 17' 30" 2462.2 feet along government land to a 3 x 3 redwood post;
7. 58° 54' 601.8 feet along government land;
8. 2° 15' 1209.7 feet along government land to a 1½ inch iron pin;
9. 328° 43' 40" . . . feet along government land to an iron pin;
10. 307° 23' 40" 1623.3 feet along government land;
11. 201° 03' 40" 915.1 feet along government land;
12. 295° 00' 2452.2 feet along government land;
13. 269° 59' 993.9 feet along government land;
14. 207° 49' 1348.0 feet along government land;
15. 173° 00' 900.0 feet to the point of beginning.

Area 434 acres.

And as provided by law, subject to the existing leases, I do hereby set apart as the Nanakuli Forest Reserve that portion of the Government land of Nanakuli (1010 acres) that lies within the metes and bounds of the above described Nanakuli Forest Reserve; as parts of the Makua-Keaa Forest Reserve those portions of the government lands of Keaa (1850 acres), Makua (1556 acres) and Kahanahaiki (970 acres),

altogether an area of 4376 acres, more or less, that lie within the metes and bounds of the above described Makua-Keauu Forest Reserve; and as the Kuaokala Forest Reserve those portions of the government lands of Kuaokala (Kaena) and Keawaula (434 acres) that lie within the metes and bounds of the Kuaokala Forest Reserve.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Great Seal of the Territory of Hawaii to be affixed.

DONE at the Capitol in Honolulu, this 4th day of June, A. D. 1913.

W. F. FREAR,  
Governor of Hawaii.

By the Governor:

E. A. MOTT-SMITH,  
Secretary of Hawaii.

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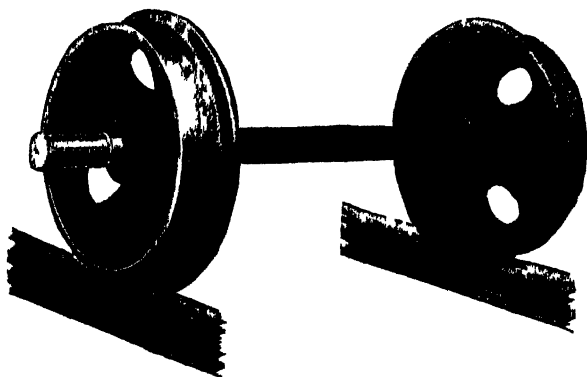
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# THE HAWAIIAN FORESTER AGRICULTURIST

VOL. X.

JULY, 1913.

No. 7.

Some idea of what the Territory of Hawaii owes to the Division of Animal Industry may be obtained from a perusal of the monthly reports thereof in this number. The promptness with which suppressive and preventive measures are taken whenever any disease among live stock is reported saves many thousands of dollars of loss every year. It is very gratifying, also, to have evidence that the methods of the official veterinarians exemplify the latest word in scientific practice.

It would be impossible to imagine, after considering the reports from month to month of the Division of Entomology, what the condition of agriculture in Hawaii would be were the constant fight to exclude and exterminate pests suspended even for one month.

Attention is directed to the notice by Mr. Hosmer of the bulletin on Hawaiian names of plants and the book on indigenous trees of Hawaii, both written by Mr. Rock.

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"The aim of the Division of Forestry," Mr. Hosmer says in his June report, "is to be of direct and practical use to the people of the Territory." This none can gainsay who have knowledge of the progress made in forestry in these islands since the small practical beginning made in governmental forestation a little over a quarter of a century ago, the greatest strides having been made since Mr. Hosmer, subsequent to annexation, placed the work on a scientific basis. Prior to that time, however, the sugar planters were taking a lively interest in tree planting, as a result of which there are many fine growths of forest throughout the islands. How their interest continues is evidenced by the demands they are making on the government nursery, of which the 16,000 plants taken by them in June last past constitute but an ordinary monthly incident. In the Eastern States just now municipalities are planting forests with the expectation of returns in due time which will do away with the necessity of civic taxation. If that can be done there, what possibilities of forestry are not present in Hawaii, where the growth of trees is so much more rapid?

In this issue the publication is begun of a treatise on "The Kalo in Hawaii," of which Professor MacCaughy and Mr. Joseph Emerson are the authors in collaboration, the former as botanist and the latter as historian. Judging by the introductory chapter forming the first instalment, the brochure is one that will attract much interest at home and abroad.

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An article in this number on "Insect Control," by C. R. Jones, the Philippine entomologist, seems to contain much matter of useful applicability to Hawaii.

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Various short selected articles, relating to diversified agriculture of kinds already existent in Hawaii or adapted to its soil and climate, will be found in this number.

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A review of a bulletin of the experiment station of the University of Illinois, on tubercle bacilli, appears in this number, which ought to be of much local interest in view of the campaign against bovine tuberculosis which has been so successfully established on the Island of Oahu and must in time be extended to cover the whole group.

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## DIVISION OF ANIMAL INDUSTRY.

Honolulu, June 30, 1913.

Hon. W. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry, Honolulu, T. H.

Sir:—I beg to present herewith the report for the Division of Animal Industry for the month of June, 1913:

### ANIMAL QUARANTINE STATION, HONOLULU.

The complete reconstruction and enlargement of the Station which has been under way for the past three months has been finished. The main parts of this work come under the following heads:

(1) *Dog Quarantine Section.* As already reported, six additional enclosures were provided, making a total of 24 individual enclosures, more than half of which can be made to hold two or more dogs, if the same belong to one owner or arrive approximately at the same time. The most important improvement, however, is the reinforcement of all the enclosures with a concrete embankment 12 to 18 inches wide along the inside of the foot boards, making it impossible for an animal to dig out and escape. This arrangement in no way detracts from the sanitation of the pens,

as the main part of the enclosure remains unchanged; that is, the original beach sand through which all excretions likely to contaminate the kennels may percolate to the tide water below. (2) The horse and mule section has now been completely rebuilt, the number of posts in the fences being almost doubled, so that the distance between them in no case exceeds eight feet. The stability has also been greatly increased by connecting all the posts with a 2"x4" stringer spiked to the top. This will prevent the animals from "riding" on the fence and will thereby double the life of the enclosures. All gates have been reinforced and rehung and a mixture of oil and sand applied to all woodwork exposed to the teeth of the animals.

A small chamber 9'x12' has been added to the office so that the keeper may have a place to sleep and keep his clothes, for which purpose the office has hitherto had to serve.

#### III. QUARANTINE STATION.

Dr. Elliot reports progress with the construction of this station, though the contractor has had trouble with his laborers. He seems, however, to be satisfied with the work so far as it has gone, and expects the station to be finished by the latter part of July. He further recommends that the keeper, when he secures one, be provided with some tools—spade, shovel, pick, wheelbarrow, etc.—so that he can put him to work gathering rock for the road and stable floors.

#### II. HOG CHOLERA.

As previously reported, this disease has spread to a considerable extent and many animals have died. The method of control now in vogue in the States—the injection, subcutaneously, of blood serum obtained from hogs which have been hyperimmunized against the disease—has been applied here and with seeming success; in fact, with highly satisfactory results. It may, for instance, be mentioned that in one herd of 20 to 40 animals of all sizes, and all of which were affected with the disease, some to such an extent that they could not walk, practically every one which was inoculated has either recovered or else improved, while two, which escaped inoculation by breaking through the fence, developed the disease and one of them has died, while none of the treated hogs have been lost.

The establishment of a serum institute for the manufacture of hog cholera serum here has been considered in view of the price asked for the commercial serum, which amounts to from two to three dollars for full-grown hogs. There is, however, considerable danger of spreading or perpetuating the disease here, as it is necessary to keep on hand animals infected with the most virulent

form of the disease, and in view of the limited number of hogs in the Islands the cost of manufacturing the serum here would no doubt prove exorbitant.

Special inquiries in regard to the prevalence of this disease on the other islands have been directed to the deputies of this office, but from the replies received it would appear that the present outbreak is confined to the Island of Oahu. It is therefore recommended that a regulation be promulgated at once prohibiting the shipment of hogs from Oahu to any of the other islands, temporarily. If this is approved by the Board, I would respectfully recommend that the appended Rule be acted upon at once. As the disease seems to have spread over the entire Island of Oahu, even as far as Waimea and Kahuku, it does not seem possible that anything can be accomplished by regulations prohibiting the transfer, interchange or shipping of hogs from one part of this island to another. On the other hand, it would be advisable to call the attention of the Board of Health and the Board of Supervisors to the fact that hog cholera is prevalent and that the respective Boards take steps to protect the public against the marketing and consumption of pork from hogs which have not passed a rigid ante, as well as post-mortem, inspection, such as is required by the Federal Bureau of Animal Industry. These regulations are plain and to the point, without being onerous, and as it was intimated to me only yesterday that pork had been offered for sale at ridiculously low prices, it is safe to conclude that such pork originated from pigs that had died from cholera. The disease is, however, not transmissible to human beings, nor to any of the other domesticated animals, for which reason the federal regulations permit the marketing of hogs exposed to the infection and allow the consumption of the pork so long as the animals have not developed the disease to such an advanced degree as to affect the wholesomeness of the pork.

"Territory of Hawaii, Board of Agriculture and Forestry, Division of Animal Industry.

"Rule VII: Prohibiting the shipment, transfer or exchange of hogs from the Island of Oahu to any other island of the Territory of Hawaii.

"It having come to the notice of this Board that a disease known as hog cholera or swine plague is prevalent among the hogs on the Island of Oahu, it is hereby ordered:

"Section 1. Until further notice no hogs (of whatsoever age, breed, or description) shall be shipped, carried or transferred from the Island of Oahu to any other island of the Territory of Hawaii.

"Section 2. This order shall take effect upon its approval by the Governor."

## CEREBRO SPINAL MENINGITIS.

This highly fatal disease among horses and mules has fortunately not spread to the extent that it was feared might result from the heavy rains following a prolonged drought. The outbreak at Fort Shafter resulting in the death of four mules may possibly be ascribed to some other cause, that is, poisoning with a weed contained in the hay (imported from California) which was being fed to these animals at the time of their death. Fortunately some of this hay was secured, and as will be seen from the appended letter from Mr. Rock, botanist to the College of Hawaii, the hay contains not less than ten per cent. of the poisonous weed in question. What remains of the bale, about 40 lbs., is being fed to a mule in order to ascertain whether the weed in question could have been the direct cause of the death of these four mules.

On the other hand, Dr. Fitzgerald reports an extensive outbreak of cerebro-spinal meningitis on the Island of Molokai, with 30 or 40 animals affected with about ten deaths. He also reports a number of scattered cases of the same disease on the Island of Maui. From Hawaii and Kauai no definite information has been received, so it is to be presumed that, for the present at least, the danger of a severe outbreak seems to have passed.

## RABIES AND HYDROPHOBIA.

The newspapers from California and adjoining states and the official reports of live stock commissions and live stock sanitary boards indicate that this disease is far from being suppressed, and the number of human beings, especially children, reported to have been bitten by mad dogs seems to be constantly increasing. On top of that it appears that the health authorities of San Francisco have been prevailed upon to rescind the muzzling act, on account of the hot weather, and substituting it with an order that all dogs must be in leash when on public highways or streets. This is the same fatal mistake that has perpetuated the disease in so many other countries, causing numbers of deaths and untold suffering. Only those countries which have enforced the continuous muzzling of all dogs in public places, in connection with stringent quarantine of all imported dogs, have succeeded in exterminating the disease. From personal observations for the past twenty years I feel convinced that this abrogation of the muzzling act in San Francisco will result in an immediate increase in the number of cases of rabies, and it consequently becomes necessary for us to increase our vigilance against the disease gaining an entrance here. For this reason I have to express my appreciation of the support of the Board in perfecting the dog quarantine station to a point where even the most fastidious cannot raise a single

objection to the detention of their dogs for a period which to many seems exorbitant and unnecessary.

Very respectfully,

V. A. NORGGAARD,  
Territorial Veterinarian.

# REPORT OF ASSISTANT VETERINARIAN.

Honolulu, June 28, 1913.

Dr. V. A. Norgaard, Chief of Division of Animal Industry.

Sir:—I beg to submit herewith my report for the month of June, 1913:

## *Tuberculosis Control.*

The appointment of Mr. Richards, past city and county milk inspector, as assistant to this division by the Board of Commissioners, has enabled us to take up again the tuberculin testing of dairy cows as required by the municipal milk ordinance. The fourth general test of the dairy herds of the city and county of Honolulu has now commenced and is progressing rapidly. Since June 9 twenty-nine (29) dairies have been visited and a total of one thousand one hundred and thirty-two (1132) animals subjected to the test, out of which number, as far as we are able to report at the present time, 49 cows have been condemned. The following tabulated list gives the name of each dairy visited, with the total number of animals tested, passed and condemned in each:

	T.	P.	C.
June 9-12—Joe Gouviera .....	41	40	1
N. B. Brown .....	39	39	0
M. Salina .....	30	28	2
J. W. L. McGuire.....	20	19	1
S. I. Shaw.....	22	22	0
S. T. Grace.....	7	7	0
Waialae Dairy .....	59	55	4
Chas. Lucas .....	29	29	0
June 13-16—Waialae Dairy .....	234	226	8
R. Compos .....	79	74	5
June 14-17—Chas. Lucas .....	53	46	7
June 17-19—Jose Gonzallas .....	35	33	2
R. A. Franco .....	20	19	1
Nishimoto .....	10	10	0
M. M. Pedro.....	20	20	0
June 18-21—J. M. Whitney.....	13	12	1
J. H. Cummings.....	6	6	0
W. E. Wall.....	13	12	1

June 20-23—	Waialae Dairy .....	128	121	7
	W. P. Alexander.....	5	5	0
June 23-26—	J. H. Cummings.....	1	1	0
	W. E. Wall.....	1	1	0
	I. Nagaki .....	22	21	1
	H. E. Cooper.....	19	19	0
June 24-27—	T. F. Farm.....	73	68	5
	F. Medieros .....	20	20	0
	P. Miyakawa .....	15	15	0
	K. Inouye .....	14	14	0
	K. Yamashita .....	17	17	0
	M. K. Young.....	15	14	1
	S. Hirata .....	20	20	0
June 25-28—	Oahu College .....	15	15	0
	Mills Institute .....	18	18	0
	College of Hawaii.....	19	17	2

It is very encouraging to note that considerable improvement has taken place in Mr. Isenberg's herd in the last five months. In January, 1913, a total of 470 animals were tested at Waialae and 63 condemned, the percentage of diseased animals being 13.4%. This month a total of 421 animals were tested and 19 condemned, the percentage of diseased animals being 4.5, which is a very great improvement. Under the efficient management of the ranch at the present time, where thorough disinfection of all barns is immediate, and absolute segregation and early slaughter of all condemned animals is practiced, improvement in the herd is bound to be rapid. Mr. Isenberg is to be congratulated on the consistent way in which he has fought this disease, which was present to such an alarming extent in his herd four years ago, and on the good results which are now being realized.

I have been fortunate enough to be able to make post-mortem examinations on four cows condemned on this test and have found all affected with the disease to a greater or lesser extent. The results of these examinations are as follows:

One cow from Joe Gouviera's herd. The animal was in fine condition; the reaction was large and of a typical character. Post-mortem lesions of the disease consisted of a few small nodules in the broncho-esophageal glands; all other organs in the body clean.

Three cows from Charles Lucas' dairy were killed at one of the local slaughter houses, resulting as follows:

No. 1. Condemned on the 17th and slaughtered on the 19th. Swelling at point of inoculation still present. The presence of the disease was shown by a few small nodules in the sub-lumbar lymph glands; all other organs in the body clean.

No. 2. Swelling at point of inoculation still present; retro-pharyngeal glands contained a few small nodules; diaphragm-



atic lobes of the lungs contained three tuberculous abscesses, one of which was double the size of the closed hand. All contained the characteristic gritty pus.

No. 3. Swelling at point of inoculation still present. Disease present in the left retro-pharyngeal gland, which was greatly enlarged, measuring 5" long and 3" wide and filled with tuberculous pus. All other organs in the body clean.

In all of the above animals the disease was of a localized nature and the carcasses in fine condition, and the meat was therefore passed for food. As has been noticed before, the size of the local swelling constituting a reaction has no definite relation to the amount of disease in the animal body, as sometimes a very pronounced reaction will be observed when the lesions are small and few in number. There is no doubt that there is nothing constant in the size of swelling, and that an animal may at one time give a pronounced reaction and at another time a swelling half the size. The degree of reaction varies as the anaphylaxis of the animal tissues is of a high or low degree, and this degree cannot at all times express correctly the amount or stage of the disease, as it is conceivable that when first infected and when the disease is becoming established the tissues of the body would be in a highly sensitive state, and the injection of the toxins in the tuberculin cause a violent reaction and the following post-mortem examination would have to be careful indeed to discover the seat of the lesions.

The anaphylaxis brought about by the presence of the disease in the various organs of the body will vary as the vitality of the system varies and whether the disease is in a quiescent or active stage. It is probable that when the disease is extensive in the body the anaphylactic properties of the disease, the skin in particular, are much lowered, and as the disease progresses become less and less until at times it is entirely nil, and this condition may last for greater or lesser periods of time. Thus it is conceivable that such an animal would not give a reaction to the toxins injected and so pass the tuberculin test when extensively affected with the disease.

The post-mortem examinations I have been fortunate enough to make since the intradermal method was inaugurated have been positive; that is, the disease has been present in every case. On the other hand, I have learned of examinations being made on condemned animals where no lesions have been found. In establishing a method of testing, negative findings are as valuable as those cases which are of a positive nature. From the results thus far experienced in the use of this method, we are still firmly convinced of the great value of the intradermal method and of its equal reliability to the subcutaneous test, which has been demonstrated to be reliable in 98.36 per cent. of cases.

The following list of live stock was allowed to enter the port of Honolulu during the past month:

June 4—S. S. Korea, San Francisco: 1 dog, Lieut H S Green; 1 crate Bl. Plymouth Rocks.

June 5—S. S. Ascot, Europe: 5 cats, immigrants

June 9—S. S. Sonoma, San Francisco: 1 crate guinea hens

June 10—S. S. Wilhelmina, San Francisco: 4 crates poultry; 1 dog, W. P. Reeves

June 16—S. S. Chiyo Maru, Orient: 1 dog, Capt. Bennett; 1 crate Japanese game.

June 17—S. S. Honolulan, San Francisco: 15 horses, 2 mules, 1 colt, D. Ferriera; 4 horses, 22 mules, 1 bulldog, Schuman Carriage Company; 1 bulldog, Capt C. W. Waller; 7 crates chickens, N. B. Lansing.

June 17—S. S. Virginian, Seattle: 24 mules, Chas. Bellina; 39 horses, 2 sheep, 16 pigs, 2 cows, A. L. McPherson.

June 18—S. S. Siberia, San Francisco: 1 Boston bull terrier pup, Carl T. Schaefer.

June 18—S. S. Niagara, Vancouver: 1 white boar, T. H. Davies & Co.

June 23—S. S. Sierra, San Francisco: 49 crates poultry.

Respectfully submitted,

L. N. CASE,  
Assistant Territorial Veterinarian.

## DIVISION OF ENTOMOLOGY.

Honolulu, June 30, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of June as follows:

During the month 39 vessels arrived at the port of Honolulu, of which 21 carried vegetable matter and one vessel moulding sand.

Disposal.	Lots.	Parcels.
Passed as free from pests.....	1129	16,929
Fumigated . . . . .	11	32
Burned . . . . .	65	74
Prohibited from entry.....	1	1
Total inspected . . . . .	1206	17,036

Of these shipments, 16,282 packages arrived as freight, 84 packages by mail and 670 packages in the baggage of passengers

## RICE.

During the month 21,876 bags of rice arrived from Japan. All the various lots were examined and found free from pests and were then released. All the rice had been fumigated at Kobe.

## PESTS INTERCEPTED.

Twenty packages of fruit and 45 packages of vegetables were found in the baggage of passengers and immigrants from the Orient, as well as those which arrived from Spain on the steamer Ascot. Of the latter each piece of baggage was carefully searched for seeds which were thoroughly examined and fumigated. Several lots, being badly infested, were burned. Four large baskets of sweet potatoes from Hongkong were found infested with the sweet potato weevil and were ordered destroyed. A small lot of beans from Manila in the mail was found infested with the Chinese bean weevil (*Bruchus chinensis*) and was fumigated before being released. Two orchids badly infested with mealy bugs and the orchid scale (*Chrysomphalus biformis*) were destroyed. An ants' nest with many young larvae and pupae was found in a bale of moss coming from England. The shipment, consisting of three large bales, was fumigated for 48 hours with carbon bisulphide and after the treatment we found the ants dead. A small package of native limes from Australia was found in the mail. The fruits were infested by a few caterpillars feeding on the peel. As these were sent for experimental purposes to the U. S. Experiment Station, we saved the seeds, put out fruit in alcohol for a sample and destroyed the pulp of the other fruits.

## BENEFICIAL INSECTS.

One lot of *Colosoma* beetles was sent to the Division of Entomology by Dr. A. F. Burgess of the Gypsinoth laboratory, Melrose Highlands, Massachusetts. This is the fourth sending we have received and from this lot of 25 beetles, eight were liberated up Manoa Valley, where one of the 1912 sendings was placed. The *Colosoma* beetles are of great benefit, as they feed on cutworms and the larvae of many injurious insects. It is doubtful whether or not the beetles will become established owing to the great difference in climate.

Two packages of parasitized aphids came to Mr. O. H. Swzey of the H. S. P. A. Experiment Station from Mr. Fred Muir, also of the H. S. P. A. Experiment Station, and before these were passed they were opened in my presence. I understand that Mr. Swzey has been able to liberate quite a few parasites, which, if they become established, will no doubt assist in keeping in check some of the aphids which infest our vegetable and flowering plants.

## HILO INSPECTION.

Brother M. Newell reports the arrival of nine vessels, five of which brought vegetable matter consisting of 107 lots and 1866 parcels. Seven bags of pineapple plants were inspected and fumigated before shipment from Hilo to Maui; they were slightly infested with mealybugs.

## INTER-ISLAND INSPECTION.

During the month of June 56 steamers were attended to and the following shipments were passed:

Plants .....	64	packages
Taro . . . . .	649	bags
Fruit . . . . .	23	packages
Lilyroot . . . . .	15	"

Total passed..... 751

The following packages were refused shipment:

Fruit (on account of infestation).....	20	packages
Plants (on account of soil and infestation)...	6	"

Total refused shipment..... 26 "

## STAFF.

On June 3 Mr. J. C. Bridwell arrived from the Coast to act as assistant superintendent of entomology, and is now assisting in the breeding of the parasites of the Mediterranean fruit fly.

Respectfully submitted,

E. M. EHRHORN,  
Superintendent of Entomology.

## DIVISION OF FORESTRY.

Honolulu, June 30, 1913.

Board of Commissioners of Agriculture and Forestry, Honolulu.

Gentlemen:—I have the honor to submit as follows the routine report of the Division of Forestry for June, 1913:

## FOREST RESERVES.

On June 4, Governor Frear signed a proclamation creating three forest reserves in the Waianae District—Oahu-Nanakuli, Makua-Keaau, and Kuaokala—of which mention was made in my May report.

During this month there have been submitted to the Board reports recommending the setting apart as forest reserves (1) of the watershed on the mountains immediately back of Honolulu, (2) of the Waiakea-Olaa forest on Hawaii, (3) of the summit of the Kohala Mountain, Hawaii, with certain adjoining lands, and (4) a modification of boundary in the Moloaa Forest Reserve on Kauai.

#### HAUULA FOREST FENCE.

On June 25 I visited the Government land of Hauula in the Koolauloa District on this island, in company with representatives of the Hauula Home-steaders' Association, went over the ground and flagged the line of the proposed forest fence across the mauka portion of this land, on the location approved by Governor Frear in May, 1913.

#### PREPARATIONS FOR THE COMING FISCAL PERIOD.

Not a little time during June has been given to preparing detailed plans and outlines for the forest work to be carried on during the fiscal period beginning July 1, especially with reference to the fencing of forest reserve boundaries on Government land. In addition to thus providing for better protection for the native forest, it is the intention of the Division of Forestry to continue its regular work of growing and distributing trees from its several nurseries and of giving information and advice on forest matters, along the lines that it has followed in the past few years. The aim of the Division of Forestry is to be of direct and practical use to the people of the Territory. The calls that are made on this office prove that there is an active demand for such service.

#### BOTANICAL BULLETIN.

At the end of the month there was issued as Botanical Bulletin No. 2, a "List of Hawaiian Names of Plants," by J. F. Rock, consulting botanist of the Board of Agriculture and Forestry. This is a twenty-page pamphlet giving the Hawaiian, the botanical, and, where there is one, the English name of a large number of indigenous trees and shrubs. An edition of 1500 copies was struck off.

In this connection it may not be out of place to make mention of the appearance on June 26 of Mr. J. F. Rock's book, "The Indigenous Trees of the Hawaiian Islands." This volume gives technical and popular descriptions of over 400 trees, many of which are illustrated by excellent full-page plates from photographs taken by Mr. Rock. The more technical part of the book is preceded by a general account of the forests and forest types in Hawaii that add much to its value.

A good part of the botanical material on which the descriptions are based was collected by Mr. Rock while actively a member of the staff of this Board. The original specimens are in the Herbarium of the Board, now on deposit with the College of Hawaii.

Mr. Rock's book is not only a highly important scientific contribution; it is as well a work which can be used to advantage and with satisfaction by the general public. Issued under the patronage of subscribers, the book is now on sale in Honolulu.

#### NURSERY NOTES.

During June a new soil sterilizer has been installed at the Experiment Garden in Makiki Valley. At the Government Nursery the remodeling of the stable buildings has been completed, along with the relocation and repair of some of the other smaller service buildings. I transmit, as usual, the report of the Forest Nurseryman.

Very respectfully,

RALPH S. HOSMER,  
Superintendent of Forestry.

#### REPORT OF FOREST NURSERYMAN.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir:—The following report gives the principal work done during the month of June:

#### *Nursery.*

##### *Distribution of Trees.*

	In Seed Boxes.	In Boxes Transplanted.	Pot Grown.	Total.
Sold .....	....	...	113	113
Gratis .....	3000	410	425	3835
Total .....	3000	410	538	3948

#### *Collections.*

Collections on account of plants sold amounted to.....	\$ 2.25
Rent of building, Nursery grounds.....	35.00
Total .....	\$37.25

*Plantation Companies and Other Corporations.*

The distribution of plants as per heading amounted to 10,000 in seed boxes, 5000 in transplant boxes, and 1000 pot grown. Total, 16,000.

For a few months during the summer the distribution of plants is always small and we are therefore able to do some needed repairs to buildings, etc., with our own men. In addition to assisting in the remodeling of buildings at the Nursery, we have commenced to repair the forestry cottage on Tantalus. This cottage has been in a disreputable condition for a number of years and an eyesore to people passing that way. A couple of weeks' work with our own men will put it in good condition.

The pest known as Jerusalem Thorn (*Parkinsonia Aculeata*), which was discovered about a year ago growing on Quarantine Island, has been all dug up and burned. A gang of prisoners kindly granted by Sheriff Henry did the work.

*Experiment Garden, Makiki.*

The new soil sterilizer has been installed and is a great success. The saving of fuel and labor when compared with the old one justifies the expense that has been put on it.

A large stock of plants is being propagated for the fall planting.

*U. S. Experiment Planting, Nuuanu Valley.*

The man has been transplanting into tin cans more new varieties of Eucalyptus, also hoeing and attending to the plats already planted.

Very respectfully,

DAVID HAUGHS,  
Forest Nurseryman.

*THE KALO IN HAWAII. (I.)*

By VAUGHAN MACCAUGHEY and JOSEPH S. EMERSON.

## PREFACE.

The material in the following pages has been gathered by the authors from personal observations of kalo production, from extended conferences with many Hawaiian "taro-planters," and from a survey of important literature.

So far as is known, this is the first comprehensive collaboration of information relative to the Hawaiian kalo. It has been prepared with the hope that it may serve as a basis for research work. The Hawaiian kalo is a plant of great ethnologic and agricultural interest. It deserves far more attention than has yet been ac-

corded it. These articles may indicate a few of the many approaches towards this plant of venerable antiquity.

The name *kalo* is used throughout this series, in preference to the modernly-used *taro*. The authors felt that this plant should be designated by its original and authentic Hawaiian name.\* The authors realize the many gaps and incompletenesses that necessarily characterize a series of this nature. Many of the topics are treated suggestively—for example, an exhaustive study of the mythology of Hawaiian *kalo* is yet to be made. This series is to be considered as a reconnaissance.

## 1. INTRODUCTION.

The *kalo* is one of the most important food plants utilized by the human race. Together with its immediate relatives, it has been intensively cultivated by peoples of the tropics and subtropics since the dawn of man's dominion over nature. *Kalo* has always been the chief food of the Hawaiian race, and of many other peoples of Oceanica.

At this point attention may be properly directed to some of the salient features of the Hawaiian Islands and the Hawaiian people, with special reference to *kalo* production.

The Territory of Hawaii consists of an archipelago two thousand miles long, in the North Pacific Ocean. It is 2100 miles west of San Francisco and 4700 miles east of Manila. These islands were discovered by Captain Cook in 1778. The land surface of the eight inhabited islands aggregates about 6500 square miles, being a little less than the State of New Jersey. The largest island, Hawaii, has an area about the same as Connecticut.

To the northwest of the larger islands lies a series of tiny coral atolls and barren rocks, the majority of them scarcely rising above the surface of the sea. These have a combined area of less than six square miles, and are of no agricultural significance, save as sources of guano.

This chain of islands is of volcanic origin. Volcanic activity has evidently moved southeastward along well-defined fissures. The smaller, most deeply-eroded islands, having fewest traces of recent volcanic action, are to the northwest, while to the southeast they are larger, less eroded, with fresh lava flows and other indications of late eruptions. Indeed, on Hawaii itself, the largest and most southerly of the islands, are the two great active volcanoes, Kilauea and Mauna Loa. On this island lava-flows and other volcanic phenomena occur at relatively frequent intervals.

The four million acres that comprise the land area of Hawaii are of the following types: waste land, 32%; forest land, 25%; grazing land, 33%; arable land, 6%; reclaimable land, 4%. Water

\* *Kalo* and *taro* are merely dialectic variations of the same word.



supply and altitude are the chief factors in the productivity of the agricultural lands. Of the arable land, the most valuable is that having water rights and utilized by the kalo, rice, and sugar plantations. This aggregates about 213,000 acres, on the alluvial flats and lower slopes. Above or adjacent to these areas is a belt, aggregating 1,500,000 acres, too high or too dry for sugar-cane, and so used for grazing.\* Higher up on the mountain slopes, in many places extending well up towards the summits, are the forests, which constitute invaluable water reserves for the lower lands.

The lands of Hawaii are owned as follows: Public lands, 40%; corporately owned (chiefly sugar and pineapple plantations), 39%; individual Americans, 10%; individual Hawaiians and part-Hawaiians, 9%; individual Asiatics, 2%. The land was owned at one time entirely by the Hawaiian aborigines, who were pre-eminently farmers, and who developed a highly intensive system of cultivation. Arable land and available water were utilized to a maximum degree. The food supply of the early Hawaiians came almost wholly from the fertile lowlands that engirdle the islands, and from the bounteous ocean. Kalo, sweet potatoes, yams, bread-fruit, bananas, coconuts, sugar cane, and wild fruits constituted their vegetable food. Fish, swine, fowl and dog supplied the remainder of their diet. The pounded corm of the kalo, forming a starchy and acetic paste called *poi*, was their "staff of life," and "Fish and poi" is still a by-word for a meal.

"The limited area of the islands restricted nomadism; the entire lack of big game cut off hunting; and the absence of grazing domestic animals prevented pastoral life." Thus this peaceful, kindly people became, by force of circumstance, skilful farmers. Their ancient practices are unfortunately decadent, and little survives but deserted kalo patches, neglected groves of bananas, and slow-dying coconut plantations, to tell of the minute system that once drew tribute from every foot of good land, and was so marvelously adapted to local conditions.

During the middle of the last century there were about 11,000 native landowners, each occupying and tilling minute "*kuleanas*" of from a fraction of an acre to three acres in extent. "This division of the land illustrates the fact that the needs of the common people were filled and a relatively high state of culture developed by individual work on very small tracts; in fact, the native under best conditions can rarely make use of a larger area."—Newell.

If there is any relationship between food and physique, kalo is to be highly commended, for the ancient Hawaiian, according to unanimous report, had a superb physical development. This

\* In recent years much of this grazing land has been converted into pineapple fields.

statement must, however, be somewhat qualified. Among the Hawaiian women (and to lesser degree among the men), especially after middle age, the *poi* diet has frequently a very marked fattening effect. This tendency towards obesity is unquestionably due to the excessive starchiness of the diet, as well as to other causes. The finest forms are to be found among the young men and women. This statement also applies to Polynesia in general. Not only has *kalo* gained wide repute because of the healthful and easily-digested food derived from it, but attention has also been attracted to its heavy yields per acre. A few square rods, under proper cultural methods, will continuously produce enough *kalo* to support a large family. It is due to this great productivity that ancient Hawaii, despite its very limited area, was able to support a relatively dense population. *Kalo* is prominent among the plants recently recommended by the United States Department of Agriculture for planting in some of the Southern States.

Mr. T. F. Sedgwick reports that "taro holds about fourth place among the products of Hawaii, at least in area of land devoted to its cultivation, and probably also in total value of crop. The investment in taro growing approximates from \$450,000 to \$500,000. It is practically all consumed in Hawaii, the export of taro flour or "Taroena" amounting to but a very small percentage of the total crop.

"Taro cultivation is profitable, and land suited to its cultivation, provided it has water rights, brings a high annual rental. The average annual rental per acre in the vicinity of Honolulu for "taro land" ranges from \$30 to \$50. The average retail price of *poi* in Honolulu ranges from 2½ to 5 cents per pound. One acre will generally produce from twelve to fifteen tons, which sells for \$1.75 to \$2.50 per hundred pounds. \* \* \*

"The available irrigated taro land is about all occupied. The opening up of new areas for its cultivation would be dependent, either upon the discovery of sources of additional water supply, or upon more careful use of the water now available.

"Although taro has been the staple food of the Hawaiians \* \* \* the probabilities are that the time will come within the next one or two generations when a large share of the taro lands now in cultivation will be planted to other crops." Considerable areas formerly cultivated in *kalo* are now devoted to rice.

Mr. Barrett, in a U. S. Department of Agriculture bulletin on "Promising Root Crops for the South," writes: "The economic aroids of the world have received very little attention outside of a few tropical countries, yet some of them bid fair to become of great commercial importance within a few years, for the following reasons: They are adapted to soils which are too wet for other root crops, such as sweet potatoes and cassava; they grow rapidly, if given a fairly rich soil and a fair amount of moisture;

they yield heavily, in some cases two to four times the average yield of potatoes; their keeping qualities are in most cases excellent, whether kept in the ground in situ or in a dry place in bags; and they are resistant to insect and fungus pests."

These statements are all applicable to the Hawaiian *kalo*; indeed, it is probable that no other aroid possesses these valuable agricultural qualities to the degree in which they are manifested in the *kalo*. As rice among the cereals, as coconut among the palms, so is *kalo* chief among the aroids.

## 2. LEAVES.

These, in Hawaiian, are designated *lau-kalo*, *lau-alo*, or *la-alo*. These indicate the linguistic evolution of shortened or condensed forms. The intermediate form, *lau-alo*, has become obsolete, in compliance with the general law that intermediate forms or types, whether in linguistic or organic evolution, tend to become extinct. Compare with these names for the *kalo* leaf the names *lau-ko* and *la-o*, sugar-cane leaf, and *lau ki* and *la-i*, ki or ti leaf.

The *kalo* plant is a perennial herb having large, succulent leaves. Some of the ornamental *kalos* are called "elephant ears," from the fancied resemblance of the huge leaves to the flapping ears of the elephant. The leaves are borne aloft on tall, stocky, flexible petioles, which are of pithy structure, but amply strong to support the generous expanse of leaf surface. The petioles arise at the surface of the ground from the top or summit of the starchy corm. In Hawaiian the petiole is *hu*. This word is also applied to the outside leaves of *kalo* when they are killed by cold or drought. Each petiole is grooved along its inner surface, and well-rounded on its outer surface, and thus fits snugly around its companions in the bud. This grooving or "u-bar" effect is also a mechanical device whereby greater strength is secured than if the material were disposed in a simple cylindrical manner. The substance of the petiole is relatively weak and pithy, but due to the arrangement of the various tissues, and their normal condition of being swollen with water (turgidity), the petiole is rendered strong for its burden. If the water is drawn out of the tissues of the petiole, as by excessive evaporation, it "wilts," and is not able to sustain the leaf. The Hawaiians call *ae* the liquid or juices that can be wrung from the leaves of such vegetables as *kalo*.

The leaf-blade itself is shield-shaped or peltate. The juncture of the petiole with the leaf-blade, is called *piko*, in Hawaiian. The blade is disposed at such an angle as to catch an abundance of sunlight. The leaves do not overlap very much, so as to shade each other, but rather fill in all the available spaces, and avoid infringing upon each other's territory. This is especially necessary in the case of large, undivided leaves like the *kalo*, banana

and *ape*, otherwise some of the leaves would be more or less completely shaded, and to that extent unable to participate in the important work of starch-making, as this process can take place only in the presence of sunlight. In the case of such plants as ferns, the leaves of which are commonly much divided, and which do not need direct sunlight (as is evinced by their habitat in shady woodlands), this shading of the leaves is not so detrimental, and the leaves are therefore frequently crowded into dense rosettes.

The kalo leaves may rise from one to five feet above the ground, varying according to the variety, and to the conditions under which it is growing. Wild kalo, growing in shaded places, commonly has long, spindling petioles, as a result of the leaves' struggle to attain the sunlight. In order to support the broad expanse of leaf-surface the veins are prominently developed. This may be easily seen by examining the under-surface of a leaf. This prominent skeleton of veins in the kalo leaf is in striking contrast to the absence of such a supporting framework in the body of such a plant as the sea-lettuce, which is abundant along many Hawaiian beaches, and resembles wet, green, crumpled tissue paper. The sea-lettuce lives in quiet tidal pools, and so has little need for skeleton or rigid framework.

Just within the edge of the kalo leaf is a continuous vein parallel with the margin and connecting the ends of the lateral veins. This peripheral vein strengthens the margin of the leaf and aids in preventing tearing by the wind or other agencies. Many large entire leaves are protected in this manner. A notable exception is the banana, whose leaves have no such marginal veins, and are therefore usually blown to tatters. The peripheral vein of the kalo leaf opens, by means of large pores, out through the margin. "Frequently in sunshine immediately after rain there is a superfluity of water in the plant, and this is reduced by the discharge of water through these pores—a phenomenon known as 'weeping' which is rather common among the aroids."—Barrett.

The kalo leaves are remarkably smooth textured. The leaves of many plants are characterized by hairy or wooly coverings, but the kalo leaf is entirely devoid of such protection. Immunity is secured by the presence, in all parts of the plant, of acrid substances and gummy secretions. The yellowish juice or latex upon exposure to the air rapidly thickens and turns brownish, forming a viscid gum. The true sap produces an indelible reddish-brown stain.

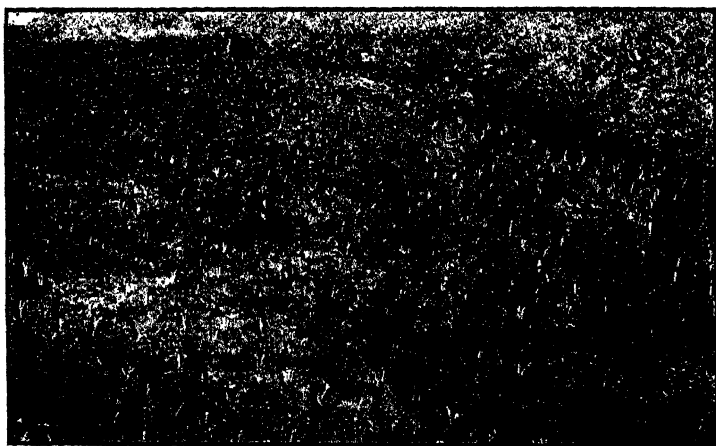
A slight shower fills the concavity of a horizontal kalo leaf with a tiny pool that glistens like quicksilver. Wild kalo frequently grows near the springy places where the woodland wayfarer pauses for a drink. Its freshly-plucked leaf, folded across the base, is a most convenient and artistic cup.

The young leaves are formed in the center of the plant, being furled each within the petiole of the next older leaf. One by one

these delicate younglings protrude from the base of the innermost leaf. Day by day they unfurl till fully spread out in the sunshine to do their work for food manufacture. All parts of the plant are useful—the young leaves (called *haha* or *liko*) and flowers are cooked and eaten as *lu'au* or greens.

*Lu'au* is made from the delicate inner leaves of the kalo top. The outside leaves were only used as wrappers around the bundle of kalo when cooked in a native oven. As the young leaves are picked in an unfurled state, those who wish to sell a poorer quality of older leaves for greens are in the habit of carefully furling or rolling them so as to imitate the genuine article. Since *lu'au* was an essential part of every native feast, the term *lu'au* has come to be a designation for the feast itself.

The older, outer leaves are designated *la-ele*. This is a shortened form of *lau-ele*, which is the obsolete original form, and means literally a dark or brown leaf. These tough, weather-worn outer leaves are not suitable for use as food, as was indicated above. They are used as food for swine; may be put onto the kalo field for fertilizer; or may be used as wrappers around the bundle of kalo when cooked in the native oven. When used as fertilizer on the kalo patch they are called *kipulu*.



*A KALO LO'I NEWLY PLANTED.*

Note the *kuli makua*; the saturated soil; the embankments overgrown with coarse grasses and wild *Canna*. The irrigation water entrance shows above center of picture, and exit near lower right-hand corner.



YOUNG KALO.

Each plant has put forth two or three leaves. Note the irrigation water in lower right-hand corner; the adjoining patches; the embankments; the manner in which the soil has been broken up. The banks are covered with *honohono* (*Oplismenus compositus*.)

### INSECT CONTROL.

The following extracts are from notes by C. R. Jones, entomologist, in the *Philippine Agricultural Review*:

The losses caused by insects to various crops, garden truck, and shade trees is far in excess of that supposed by the general observer. This loss is steadily on the increase instead of on the decrease, due to the fact that agricultural areas are becoming larger, thus destroying natural food plants of insects and introducing a new environment. Insects that were formerly unknown as a pest may become noxious on closely allied cultivated plants due to the change in environment and the destruction of the normal host plant; thus we see that the injuries caused by insects and the loss in money value are gradually increasing.

There are several factors which come under the head of natural agencies regarding the control of insects; these may be classed as climatic conditions, and predatory and parasitic enemies. In the control of an insect pest, we should, in addition to these combined natural agencies, apply our artificial means in an energetic, syste-

matical, and cooperative campaign so far as possible. The combined efforts on the part of the planters in a given locality are absolutely necessary, as the efforts of a single person combating or entirely eradicating an insect pest in a single field are of no avail when possibly his next neighbor's field is an ideal breeding place sufficient to supply the entire community.

In order to ascertain when and by what means active measures should be taken in regard to any pest, it is first necessary to study the habits and life history of the insects in question and it is here that the planters can aid greatly by reporting injurious insects and submitting to this Bureau specimens of the plants attacked, together with live and alcoholic insect material.

Numerous requests are made on this Bureau for remedies for various insects, but in most cases they simply state that "an insect is injuring the crops" and ask for the best method of treatment. To requests of this kind it is impossible to give any definite answer without knowing the kind of insect or its method of attack.

Sometimes we receive notice that insects are destroying coconuts, palay, shade trees, or other plants, and we are requested to make an investigation. It is not infrequent that we find, upon investigation, merely the results of the insects, or that the latter are in the last stage of development and that the damage by the prevailing generation is already done. In such cases treatment is of no avail. The danger is over and the plants are safe until the appearance of the succeeding generation. If these insects had been reported in due time, their ravages could have been checked, or a study of the life history and habits could have been made and a remedy given for future outbreaks.

In order for us to give remedies and answer questions intelligently, persons requesting information relative to destructive insects should observe the following points:

1. Insect ravages should be reported at first appearances and not when damage is done.
2. Always submit specimens of the insects in question and of the infested plants.
3. Give the general character of the injury and extent of damage.
4. State the part of the plant attacked.
5. In submitting specimens put them in alcohol or "vino" and give all possible information concerning the insect and its habits.

#### NATURAL INSECT CONTROL.

Many factors, such as birds, climatic conditions, predatory and parasitic insects, may be placed under the heading of natural insect control. Of these, parasites may be put at the head of the list, as they attack various insects in the egg, larval, pupal, and adult stages. Hymenopterous parasites are probably in excess of all other orders of insects.

A noteworthy incident of natural insect control occurred recently when the eggs of a Pierid were parasitized by a small Hymenopter to such an extent that the ravages of the last generation of this insect were rendered negligible.

The eggs of this Pieridae are deposited singly on the under side of the leaves of *Cassia siamea* Lam. Upon hatching, the larvae have heretofore, during the course of their development, completely defoliated the trees which they had attacked.

During November of last year eggs were noticed to have been deposited liberally on the leaves of these trees; some were taken to be bred in the laboratory, and preparations were made to spray the trees when the eggs should have hatched. The collected eggs hatched, but those on the trees did not. Upon examination the latter were all found to be parasitized.

#### PLANTS RESISTANT TO INSECT ATTACK.

Plants often resist insect attack by "abnormal" growth and by exuding a sticky sap or other similar substance. A noteworthy instance of a plant resisting the attack of insects occurs in the seed heads of lettuce (*Lactuca sativa* L.). Upon the slightest touch to lettuce seed heads this plant exudes a milky, sticky substance, and when the insects alight upon it they are immediately fastened to the plant, and in their efforts to get away the plant is disturbed still more, causing it to throw out still greater quantities of this protective latex, till at last the insects are held rigid and thus soon die. Lately, at Singalong, it was noted that the lettuce seed buds were covered with dead insects, including the following:

Pentatomidae: *Nazara viridula* Fabr.; *Eurydema pulchrum* Westw.

Phrithocoridae: *Dysdercus singulatus* L.; *Dysdercus poecilus* H. S.

Capsidae: One species; Hymenopterous parasites, four species; Diptera and Microdiptera, five species.

Chrysomelidae: *Aulacophora coffeae* Hornst; one other species.

Lygaeidae: One species.

Reduviidae: One species.



## CINCHONA.

Ever since the efficacy of quinine against malarial fevers was discovered and the drug introduced into Europe in 1639, there has been great interest in the plants from which this valuable drug is obtained, especially among those European nations possessing colonies in the tropics, and subsequent to the introduction of the cinchona plant into India in 1861 its cultivation has spread over considerable areas in that country; it is also extensively cultivated in Java.

The cinchona is indigenous to tropical South America, occurring between the tenth and the twentieth degree of latitude and is found at its best at an altitude of from 450 to 1800 meters. The number of species that yield quinine is considerable, but there are only a few that are sufficiently rich in the drug to warrant their exploitation for this purpose. *Cinchona calisaya* Weddell, of which there are several varieties, is richest of all in quinine (containing 5 to 6 per cent.) and therefore this species is the one most extensively cultivated. One of its best-known forms is *C. ledgericena*. *C. calisaya* is a tree very variable in size that thrives best at an elevation of 450 to 900 meters. *C. succirubra* Pavon attains a height of 15 meters or more, and succeeds up to an altitude of 1800 meters, preferring a cool climate. *C. officinalis* Hooker is a straggling tree some 6 meters in height; like the preceding species it does best in the higher elevations. The cinchonas succeed best on hillslopes where the soil is rich and well drained and where the rainfall is fairly abundant, though in this latter respect they are not so exacting as was formerly thought. The plants are easily propagated from seeds or cuttings.

It is quite probable that the cinchonas will thrive in many parts of the Philippines having the right qualifications and the Bureau of Agriculture has recently introduced *C. calisaya* with this object in view. — P. J. Wester, in *Philippine Agricultural Review*.

## COCONUT AND COCOA.

The world is consuming hundreds of tons of coconut "butter" daily. We are also using one way and another very large amounts of cocoa butter, which is translated cacao tallow. This tallow, made as a by-product in chocolate manufacture, is a very highly nutritious food in itself and a sort of flavoring "filler" for many sorts of confectionery, etc. It is also extensively used by the medical profession.

While formerly it was considered of not much value, largely on account of its use being hardly understood, it is now worth more than the product itself, something like 2 pesos a kilo. Unfortunately the British, and to some extent the American, manu-

facturers persist in using this old-fashioned and more or less execrable word "cocoa" instead of cacao. Not only in resemblance of words, then, but actually in commerce, do these two comparatively new vegetable "butters" stand as rivals.—(C. W. Barrett, in *Philippine Agricultural Review*.

### WATERING OF CUTS IN RUBBER TREES.

A paper has recently been published in the *Agricultural Bulletin of the Federated Malay States* (Vol. I, No. 7) which is important from two points of view. In the first place it contains results that are likely to be of practical value, and in the second place it affords an example of an original investigation that has been undertaken by a planter. The first experiment in the investigation was designed to show whether the commonly practised custom of watering cuts lengthened or shortened the duration of the dripping period. In round numbers it was found that when the cut was watered the tree continued to drip for eighty-one minutes, when the cut was not watered, for 102 minutes; that when the tree was watered it yielded 250 drops, when not watered 510 drops. A second and more extensive experiment led to the astonishing conclusion that one thousand trees would give about  $\frac{3}{4}$  lb. less rubber a day if water were poured on the cuts than they would give if the cuts were not watered.

The reason for this appears to be that the addition of water induces coagulation.—*Agricultural News*.

### LIME JUICE AND SCURVY.

The most notable example of the effect of certain substances existing in food in only minute traces is afforded by the investigations that have led to the discovery of the cause of beri-beri. Volume IX of the Annual Reports of the Chemical Society (1912) contains a review of this work, where the well-known fact is referred to, that the disease is prevalent among rice-eating communities in which decorticated or polished rice is consumed. Whole rice does not induce the disease. The substance inhibiting beri-beri has been extracted from rice husks by water or alcohol, and an alkaloid has been isolated to which the name of oryzanin is given. Small quantities of this substance keep animals free from the disease.

More recently, in the *Journal of the Chemical Society* for March, 1913, an investigation along similar lines is referred to, which has brought to light the fact that lime juice contains an anti-neuritic substance which is probably a specific cure for scurvy.

The investigation was hampered by the guinea pigs experimented on refusing to take oats—a diet which leads to scurvy in these animals. Several new nitrogenous compounds were isolated from the lime juice, however, and a continuation of the investigation will in all probability lead to the recognition of lime juice as a valuable source of anti-scorbutic substances.—*Agricultural News*.

### COTTON PICKER.

A description is given in the *Experiment Station Record*, for December, 1912, of a new cotton picker, the mechanism of which consists of a 16-inch cylinder, 12 inches long, on which are mounted twenty spindle shaft frames each carrying seven spindles, making 140 picking fingers in all. As the cylinder revolves, the spindles are caused to revolve at high speed as they stand in a vertical position, and the cotton wraps around them. When they come to a horizontal position they are thrown out of gear and the cotton is stripped off and passed to a basket in the rear. It is claimed that this picker will do the work of from ten to twelve men, requiring only a team and driver.

### FATE OF TUBERCLE BACILLI OUTSIDE THE ANIMAL BODY.

A very extensive investigation of the mode of dissemination and outside behavior of the organism causing tuberculosis in animals comprises Bulletin No. 161 of the University of Illinois Agricultural Experiment Station. The author of the paper is Dr. C. F. Briscoe.

In the summary of the bulletin it is stated first, that there are four recognized types of tubercle bacilli; human, bovine, avian, and a type that infects cold-blooded animals. The tubercle bacillus does not form spores, nor does it secrete a soluble toxin, though the fact that poisons are produced is well recognized, since tubercles can be brought on in animals by the injection of dead cultures.

The author next proceeds to emphasize the importance of definite knowledge as to the powers of vitality of the organism outside the animal body, namely, its capacity for resisting conditions of environment inimical to its existence.

The tubercle bacillus, although it does not form spores, is one of the most resistant species of bacteria; it can, however, be killed in a few minutes to a few hours when exposed to direct sunlight. The time of killing is less at higher altitudes, but it is ten to fifteen times longer in diffused light.

Tuberculosis sputum reduced to dust and inhaled by animals causes tuberculosis, and a much less amount is necessary to produce the disease by inhalation than by ingestion, though infection by ingestion is believed to be more common than is generally supposed.

It is next pointed out that a decrease in the number of cases of tuberculosis can, in many places, be correlated with an improvement of the water supply. It is reported that tubercle bacilli live for several months to more than a year in water and other material.

As regards the exact time that tubercle bacilli live under certain conditions of environment, it was found that whereas pure cultures of non-spore-bearing organisms and the vegetative cells of spore-bearing germs exposed to direct sunlight in thin smears were killed in half to six minutes, the human, bovine and avian types of tubercle bacilli exposed in the same way were killed in one to four minutes.

The former group of organisms exposed to desiccation in the dark died in one to four days, spores of *B. subtilis* took thirty-five days; the tubercle bacilli, four to eight days.

Pure cultures of bovine tubercle bacillus mixed in cow manure and exposed in a 2-inch layer in a pasture field in the sunshine remained alive and virulent for two months. Guinea pigs inoculated with germs exposed in manure in the shade developed the disease with greater severity than those animals which were inoculated with germs not protected from the sun.

Tubercle bacilli in the manure of a naturally infected cow, exposed in the same manner as the artificially infected manure, were dead within two weeks after exposure, whilst those bacteria in garden soil and in a dead tuberculosis guinea pig buried in garden soil were alive on the 213th and 71st days, respectively, and dead on the 230th and 99th days, after first exposed.

Tubercle bacilli live for more than a year in running water. A watering trough harboring these germs may therefore be a dangerous source of infection to cattle.

Another possible source of infection is the bones of tuberculous animals which have been ground and utilized for manurial purposes. The danger from this source would, however, be obviated if the bones were steamed as is frequently done.—*Agricultural News*.

## LEGUME INOCULATION.

MARTIN J. PRUCHA.

(Circular No. 15, Department of Plant Physiology, Cornell University Agricultural Experiment Station.)

During the past ten years much interest has been created in the use of atmospheric nitrogen by bacteria associated with the legume crops. The Department of Plant Physiology at Cornell University has received, within recent years, a considerable number of inquiries with respect to the subject. These inquiries have been particularly concerned with the introduction of the root-nodule-forming bacteria into fields. Questions respecting the "how" and the "when" to inoculate have been numerous. Many of the letters reveal the fact that the writers possess vague or erroneous ideas concerning inoculation. During the past few years the department has been investigating the subject. In order to set forth briefly and simply the essential facts, as well as to call attention to the pure cultures that the department is now distributing, this circular is presented to the public.



FIG. 30.—Root of soy bean, showing nodules. Natural size.

## DIFFERENCES BETWEEN LEGUMES AND OTHER PLANTS.

Leguminous crops are very rich in protein. Alfalfa hay, for example, is almost as rich in nitrogen as is wheat bran. In fact, all the leguminous crops, whether in the form of hay or of seed, differ from other crops in that they are richer in nitrogen content. They are, therefore, very valuable crops.

There is another point of difference between legumes and other plants. If a leguminous plant is carefully dug up and the roots are washed, a number of wart-like swellings may be seen on the roots. These swellings are commonly called nodules. Photo-

graphs of the roots of soy bean, alfalfa, and Canada field pea are shown in Figs. 30, 31, and 32. The

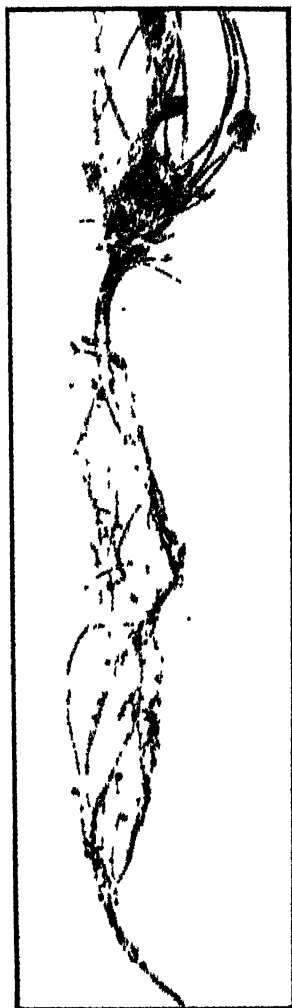


FIG. 31.—*Root of alfalfa, showing nodules. Natural size.*

nodules on the roots are of the natural size. It is seen that the size and the shape of the nodules vary with the different legumes. Under certain conditions very large nodules may develop. In Fig. 33 are shown roots of the Canada field pea grown in a loamy soil, the nodules being of the natural size.

Another point of interest, especially to farmers, is the fact that leguminous crops seem in some way to add a little fertility to the soil on which they are grown. For many centuries past, farmers have observed that non-leguminous crops, as wheat, corn, potatoes, and the like, grown on land on which clover or some other legume was raised the year before, invariably gave a better yield. It was not understood at first, but scientific study in recent years has shown that legumes may add a certain amount of nitrogen to the soil.

There are, then, three features that distinguish leguminous crops from other crops:

1. Legume crops are very rich in nitrogen.
2. Legumes have nodules on the roots.
3. Legumes add fertility to the soil.

#### NODULES CAUSED BY BACTERIA.

If an extremely thin slice is cut from one of the nodules and is magnified under the microscope about one thousand times, a large number of little rod-like bodies can be seen. Some of them are sausage-like in shape, and others may send out short outgrowths so that they are often called X and Y forms. These bodies are bacteria. In Fig. 34 are shown a few of the forms of the bacteria found in the legume nodule. They are living plants and, like other living organisms, they can

grow and multiply. They are so small that they are not visible to the naked eye; fifteen thousand of them attached end to end would not extend more than one inch. These bacteria may live in the soil, and when they come in contact with a legume root they make their way into it and there begin to multiply. In a few days the root develops a swelling, which is a nodule, near the point where the bacteria entered. In the mature nodule are millions of these bacteria.

LEGUMINOUS PLANTS WITH NODULES ENABLED TO USE FREE  
NITROGEN FROM THE AIR.

Chemists state that four-fifths of the air is nitrogen—an unlimited supply—but the plants that are raised on our farms cannot use this nitrogen because it is a gas and is not available to them. It has been observed, however, that when nodules develop on the roots of a leguminous plant, that plant is supplied with nitrogen which comes from the air. The bacteria that produce the nodules seem to have the peculiar ability to use nitrogen from the air and in some way to supply the leguminous plant with it. It is not known how the bacteria in the nodules of the leguminous plant get nitrogen from the air, but it is known that a leguminous plant with plenty of nodules on the roots accumulates a relatively large amount of nitrogen inside its tissues, and that a certain part of this nitrogen comes from the air.

*Amount of nitrogen taken from  
the air by a leguminous crop.*

Since it is well known that legumes use nitrogen from the air, farmers are naturally interested to know the amount of nitrogen that may be taken from the air by a leguminous crop. This is very difficult to decide. Many experiments have been made in order to



FIG. 32.—Root of Canada field pea, showing nodules. Natural size.

determine this, but such experiments have been performed under special conditions. The results obtained, therefore, must not be

applied too closely to field conditions. One of such experiments is reported in Bulletin 147 of the Rhode Island Agricultural Experiment Station. Several different legumes were grown in special flowerpots and the amount of nitrogen was determined both in the plants and in the soil. The authors of the bulletin found that all the different legumes that they grew were able to obtain some nitrogen from the air. From their experiments they found that an acre of soy beans may take about 1000 pounds of nitrogen from the air during a period of five years, or 200 pounds per year. Seven-tenths (140 pounds) of the 200 pounds were removed in the crop, and three-tenths (60 pounds) remained in the soil. Since one pound of nitrogen costs about 16 cents, 200 pounds would cost \$32.

We must be cautious and not jump at the conclusion that every acre of soy beans or any other legume crop, grown in any soil and under all kinds of conditions, would take out of the air an amount of nitrogen worth \$32. In some cases it may be done, but in most cases such an amount of nitrogen is probably not removed from the air by an acre of legumes. One thing is established, however, and that is that the legumes with nodules on the roots are enabled to use a certain amount of the atmospheric nitrogen and that the legumes without nodules are not able to do so.

#### INOCULATION.

We have learned from observations that nodules may not develop on all the different legumes in all soils. From this we conclude that the bacteria which produce nodules are not always present in every field. We find that legumes such as clovers, which have been raised on almost every farm in this State for many years, generally produce plenty of nodules in most soils. Legumes such as alfalfa, soy beans, and cowpeas, however, which are relatively new crops in this State, do not generally produce nodules. Since it is the bacteria that cause the nodules, and since legumes without nodules are not able to get any nitrogen from the air, it is to our advantage to introduce these nodule-forming bacteria into our fields. Inoculation, therefore, is the introduction into the fields of the bacteria that cause nodules on leguminous crops.

#### CROSS-INOCULATION.

Can one legume be inoculated with the bacteria from a different legume? This question is often asked by farmers.

It seems to be well established that alfalfa can be inoculated with the bacteria from sweet clover. Successful cross-inoculation is obtained also between red clover, white clover, and alsike clover. In general it may be stated that cross-inoculation takes





FIG. 33—Root of Canada field pea, showing very large nodules  
Natural size

place between closely related legumes. Cross-inoculation is not successful between alfalfa, clover, Canada field pea, soy bean, and cowpea. But even when cross-inoculation is successful, there is no evidence to show that it is as efficient as when the legume is inoculated with its own bacteria. The information on the subject of cross-inoculation is meager and the practice is not recommended.

#### HOW TO INOCULATE.

There are two ways in which inoculation may be accomplished, the soil method and the pure-culture method.

##### *Soil Method.*

When we find nodules on a leguminous crop, we know that in the soil where the crop is being grown there are nodule-forming bacteria. If we take a certain amount of this soil and scatter it over a new field we introduce into the new field, along with the soil, some of the bacteria. In practice, usually about two hundred pounds of soil broadcasted on every acre will be sufficient to inoculate the field. This is a simple method of inoculation and good results are invariably obtained. There are, however, some drawbacks to it. It is not always easy to get the soil, and because of its bulk it is difficult of transportation. A more serious objection to the soil method of inoculation is that when the soil comes from an unknown field various weed seeds, diseases, and insects may be in it. In that case such pests would be introduced into our field and would cause trouble. Dodder, for example, may be spread in this way. Therefore one should bear this in mind when considering the use of soil for inoculation. The method is especially well adapted for inoculating one field with soil obtained from another part on the same farm.

The writer believes that the simplest and most economical way to inoculate is, not to plant and inoculate a large acreage at first, but to plant one acre or less of the particular legume and inoculate a part of it, leaving the other part uninoculated. If the plants on the inoculated part of the field look greener and healthier than those on the uninoculated part, and in addition have an abundance of nodules on the roots while the plants on the uninoculated part have no nodules or very few, the field needs inoculation. This practice has two advantages: in the first place, the farmer learns whether the soil needs inoculation for the particular legume; and in the second place, in case inoculation is needed, the soil from the inoculated part of the field

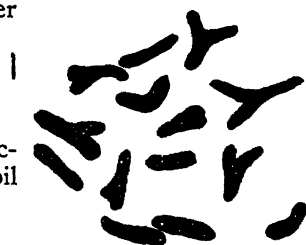


FIG. 34.—*Legume bacteria, highly magnified.*

is as good inoculating material as any other. The whole farm can then be inoculated with very little cost to the farmer.

### *Pure-culture Method.*

In order to make the inoculation more simple and to meet the various objections against the soil method, investigators have devised the pure-culture method. The nodule-forming bacteria are carefully removed from the nodules and are made pure. In making the nodule bacteria pure we separate them from all kinds of molds and other undesirable bacteria. When they are purified they are planted on some sterilized food in which they can multiply. In such food an extremely large number of the bacteria may develop in a few days. When the nodule bacteria are propagated in this manner the preparation is called a pure culture.

In some cultures the bacteria are propagated in liquid, in others on vegetable gelatin, and in still others unknown mixtures are employed. After considerable investigation this department decided to employ sterilized soil as a medium in which to grow the bacteria in pure culture.

In using pure cultures for inoculation, the object to be attained is to distribute the bacteria evenly over the entire field. Two methods may be employed in order to accomplish this: (1) The pure cultures may be mixed with a certain quantity of water and then poured on the seed. The seed is stirred until each one is moistened and is then ready for planting. It is assumed that some bacteria will adhere to every seed and will be carried with it into the soil. (2) When it is not convenient to treat the seed as above described, the pure cultures may be mixed thoroughly with loamy soil, allowing about two hundred pounds of soil for each acre. The soil is then broadcasted over the field and harrowed in.

The pure-culture method of inoculation has some advantages. Being pure, there are no weed seeds, no insects, no diseases nor undesirable bacteria, provided the culture is prepared properly. It is easily obtained, easily handled, and should be cheap.

In general, a new discovery of this kind does not at first always give good results. This was true in the case of pure cultures. The reason for these failures is very simple. At first not enough was known about the nature and the habits of these nodule-forming bacteria, and consequently they were not treated properly. The result was that often, by the time the farmer procured the culture, the bacteria in it were all dead or some wrong kind of bacteria had entered into it. Investigators have learned, however, by the failures. The writer believes that at present enough is known about these bacteria to enable workers to prepare pure cultures that will give good results.

## WHEN INOCULATION IS NEEDED.

To inoculate each leguminous crop every time it is planted requires both labor and money, and it is a waste if inoculation is not needed. On the other hand, if the crop is not inoculated, and inoculation is needed, the farmer loses money. So it becomes of some importance to know what leguminous crops should be inoculated.

There is only one known way by which the farmer can learn with certainty whether inoculation is needed, and that is to grow the crop in the field. If the root-nodules do not develop at all, or develop on only a few isolated plants, that leguminous crop needs inoculation when planted in that field. If, however, some nodules are present on almost every plant, inoculation is probably not needed. The simple experiment described on page 29 can be carried out by any farmer. By performing such an experiment he can readily ascertain which of the leguminous crops need inoculation when planted on his farm. To perform such an experiment, however, takes time, and many farmers may prefer to inoculate each leguminous crop rather than to take time for experimenting. Although there is no other known way of finding out with certainty as to the need for inoculation, there is a certain amount of information that is helpful in deciding the question.

Leguminous crops such as clover, peas, beans, and others that have been grown on farms in this State for many years, probably need no inoculation. There are some persons, however, who assert that it pays to inoculate every leguminous crop every time it is planted. It may be true that such a common crop as red clover may be improved by inoculation, even in New York State where it has been grown extensively for many years. It has never been proved conclusively one way or the other; but the writer's opinion, based on casual observation, is that soils on most farms in New York State are naturally well inoculated with the bacteria that produce nodules on legumes that have been repeatedly raised on the farms. On the other hand, alfalfa, soy beans, cowpeas, and any other leguminous crop that has never been raised on the farm, as a rule need to be inoculated when planted for the first time.

That inoculation is needed in most cases when alfalfa is grown for the first time has been shown in Bulletin 313 of the New York (Geneva) Agricultural Experiment Station. In one hundred and three experimental fields of alfalfa, distributed in thirty-nine counties of this State, only twenty-five were successful without inoculation. The authors say that in beginning to grow alfalfa proper inoculation of the soil is a point that is worthy of the careful attention of any farmer in this State.

## WHY INOCULATION IS NOT ALWAYS SUCCESSFUL.

It occasionally happens that inoculation does not produce good results. There are various reasons for this, but usually it is due to the poor quality of the culture or to the condition of the soil. The culture must not always be blamed. We all know that some crops grow well on our farms, while others may grow poorly or not at all. Bacteria are living plants, and in order to enter the roots and produce nodules they must live and multiply in the soil. There are some soils in which the bacteria will not live and no amount of inoculation will produce good results. Or it may be that the particular legume does not grow well in the soil. In either case good results from inoculation cannot be expected. The fault of the soil must first be corrected. It has been found that an application of lime—about a ton per acre—invariably benefits certain of the leguminous crops, alfalfa in particular. In Bulletin 313 of the New York (Geneva) Agricultural Experiment Station there are given some interesting results on the benefit of lime for alfalfa. Sixty-four alfalfa fields, well distributed over the State, showed that only eleven were successful without lime, and all the fields except six were improved by the addition of lime.

## STERILIZED SOIL CULTURES.

As previously indicated, this department has developed a method for distributing nodule-forming bacteria in pure culture. It has found that in sterilized soil, which it uses, these bacteria multiply readily, as many as three billion being present in an ounce of the soil. During the past two years a limited number of these cultures have been distributed, principally for experimental purposes. Because of the favorable results obtained the department proposes to distribute the cultures for general use among the farmers of the State.

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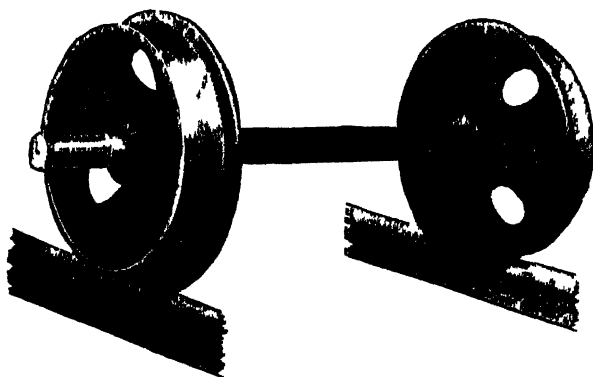
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# THE HAWAIIAN FORESTER AGRICULTURIST

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VOL. X.

AUGUST, 1913.

No. 8.

## *AMERICAN FORESTERS HELP PALESTINE.*

An agricultural colony in Palestine has just applied to the U. S. forest service for help in planting trees to bind the drifting sands of the Mediterranean. The colony is near Jaffa, or Yafa, the ancient Joppa of the Bible, and there is being developed in connection with it a seaside resort, with hotel, villas, bath houses, and gardens.

The experts of the service point out that the reclamation of sand dunes is not a serious problem in the eastern United States because the prevailing winds are from the land and the sand is blown into the sea. On the west coast the situation is more serious. The most notable example of reclaimed sand areas there is furnished by Golden Gate Park, San Francisco, where grasses, acacias, and, later, trees and shrubs have converted sand wastes into pleasure grounds of great beauty.

The attention of the Palestine colony is called to the wonderful reclamation of the Landes, France, where a wealth-producing forest of maritime pine, the source of the French turpentine, has been grown to take the place of shifting dunes. The American foresters also give the address of the French seedsman who furnished this government with the maritime pine seed which has been used in planting experiments on the Florida national forest, near the Gulf coast.

Hampton Institute's work for negroes will probably afford some ideas of value for consideration by the promoters of vocational instruction in Hawaii.

Anything Hawaii takes up in the way of new agricultural industries is sure to be noticed abroad. Progressive methods appear to be taken for granted as appurtenant to these islands. The best way to live up to this reputation is perseverance in combating obstacles of pests and of other things, and by looking out for all good ideas put in practice in other countries of similar conditions. Many things have been fitfully taken up in Hawaii and abandoned almost at the first blush of misfortune in results.



There is nothing much more in demand today than new material for paper-making. No doubt there are many plants of tropical and sub-tropical feasibility of cultivation which might be utilized for the purpose in question. Several have been mentioned in articles appearing from time to time in the *Forester*. One is noticed in this number. An article descriptive of another is reserved for a later opportunity. With the fuel problem once an obstacle to manufacturing in Hawaii to some extent solved by cheap electric power and mineral oil, the conversion of raw material into pulp or even finished paper here should not be regarded as a wild proposition. What is most immediately important in the matter is finding suitable raw materials. Hawaii itself is a consumer of considerable quantities of many kinds of paper, while the waste of different of its agricultural products is undoubtedly suitable for paper-making stock.

From the goodly amount of notice Hawaii received in the metropolitan press on the occasion of its slender exhibit at the international rubber exhibition in New York last year, it may fairly be premised that with a worthy exhibit of all of its commercial products in London next summer, on the occasion of both the rubber and the tropical products exhibitions to be held there conjointly, everything that these islands are now producing would be introduced to the markets of the world very effectively. No amount of literary advertising will rival such an opportunity of showing the wares themselves to people ready to buy on evidence of merit. In addition to the presentation of our products to the attention of European purchasers, the exhibitions in question will afford one of the grandest opportunities possible for setting forth the attractions of Hawaii to tourists and investors both. All that is needed is taking proper advantage of the big chance.

An article in this number, reproducing the suggestions of the University of Nebraska experiment station on the care of milk and cream in the home, should be as valuable in Hawaii as in the northern locality for which it was prepared.

Homesteaders in this Territory will find some edifying material in an article from Australia reprinted elsewhere on the advantages of good cultivation.

A request for the *Forester* regularly has been received from a South African institution, together with a list of names for mailing sample copies to leading agriculturists in that country. The request will be cheerfully complied with.

This number contains No. 2 of Messrs. MacCaughy and Emerson's paper on the *kalo* (taro) in Hawaii.

Reports of the various divisions of the Board of Agriculture and Forestry for July have not been received in time for publication in this number.

Cotton growing has been abandoned by the Kunia Development Company on this island, owing to the ravages of the boll-worm, and the company has given a lease for nine years and nine months of fifty acres of its land to two Japanese, who, it is understood, are raising pineapples on the holding.

At last accounts the fungus blight on pineapples on the island of Kauai had become very bad again, after it had appeared to have been overcome, the young plants now being infected. Thus far the blight has not appeared on any other island, and Kauai is being quarantined against it.

#### *CONTACT BETWEEN PLANTER AND SPECIALIST.*

(Agricultural News, West Indies.)

Nobody at the present day can fail to appreciate the enormous gulf that divides the practical man or capitalist from the specialist in science. The separation of the two positions is very patent in modern agriculture, and can be vividly realized by contrasting the mental outlook of, say, the manager of a large sugar estate, and that of the entomologist whose faculties are concentrated on the wing markings of half a dozen species of insects. It is obvious that a proper relationship, or rather a proper communication or contact between the two is of the very greatest importance, and it is the object of this article to delineate the position of the specialist, and to point out the methods that are, or should be adopted, in order that his activities may be utilized to the best advantage.

In most of the progressive agricultural communities in the tropics will be found to exist departments (boards, or else entirely non-official agricultural organizations, which employ the services of scientific specialists—agricultural chemists, mycologists, entomologists and the like. Strictly speaking—the matter will be enlarged upon later—these so-called specialists are not pure specialists, for in many cases they possess a good general knowledge of agriculture; yet in spite of this, their work is sufficiently restricted to narrow lines of investigation to render their mentalities quite different to those of practical planters. In order to contrast clearly the two types, it will be convenient to adopt a figurative illustration. The ability of the specialist may be con-

sidered as being represented by a long, narrow, vertical rectangle—his knowledge is deep rather than broad. That of the practical agriculturist can be symbolized in the shape of a square—his knowledge is of a normal nature and quite unspecialized. Clearly these two figures may be equal in area, thereby indicating a common value as regards potential ability, but the essential feature of the conception is that the two figures are so dissimilar in shape that they cannot be made to fit when placed side by side. Occasionally, as already hinted, where the specialist has received a general training, and also in a case where the practical agriculturist has received a special training, the resulting figures have more in common, and may fit fairly well. This ideal condition is seldom found, however, and at present it is generally necessary in tropical communities to have an organization at the back of the specialists, of which the main function is to connect up the two dissimilar types just described.

It is evident that the knowledge of the specialist is a source which must be tapped. In spite of departments and other organizations, there is a strong tendency in the tropics, today, for men who were originally specialists to have so acquainted themselves with the point of view and the requirements of the practical planter that they have become practitioners in the branch of science in which they are interested, and this is frequently followed by their becoming established in purely administrative positions where they direct the work, and disseminate the results of younger specialists who follow in their wake. The necessity for feeders of knowledge is greater than the necessity for producers of knowledge. This peculiar and most important trend is not altogether desirable, for it leads to the loss of research men just as they are in possession of valuable experience and in a position to tackle local problems deftly and with assurance. In fact, today we find the pure specialist more or less confined to the great centres of learning in temperate countries. There is need for more of these men in the tropics; but, until tropical public opinion better appreciates the value of abstract research by learning how to tap it, there is little prospect of such a change being brought about. In medicine, to strike a parallel contrast, the value of the specialist is clearly understood. The significance of a serious affection of the eye or of the throat for instance, is at once appreciated, and information is obtained by intelligent people at the right time and from the right authority. On the other hand, of course, an occasional ailment of these organs may be treated without the aid of skilled assistance. Judgment is exercised. In agriculture, a similar attitude is very uncommon. In agriculture the tendency is in the direction of *laissez faire*: unless the specialist rises from his microscope and searches for something to treat, results will be wasted. His mind, however, by interruption, is taken off his work, and the results have to suffer in any case.

The solution to these difficulties lies mainly in the fact that education and research should go hand in hand under proper conditions. At present there are too many isolated attempts at research in the tropics and not enough in the direction of broad education. The research man should be allowed to teach the young generation he will later advise.

Agricultural education has from time to time been subjected to considerable ridicule by practical agriculturists, even by those who have received one. That is because it has not been correctly administered. Education in agricultural science should have for its main object the teaching of where, when and why to apply for advice, and not aim merely to instil isolated facts and operations or to train specialists. The student who intends to cultivate land should not, for instance, be taught how to analyze a soil, but rather under what conditions a soil should be analyzed and the usefulness of the results.

Consequent on such a widening of the practical man's square—to speak again figuratively—his contact with the specialist will be increased without interfering either with his own particular depth and kind of information or with that of the specialist. It is true that specialization might progress, under such conditions, more rapidly than the practical man could keep up with, in which case the class of scientific practitioner already referred to, would quickly evolve; but it would be from a different cause, a more desirable cause than that which necessitates the combination of agriculturist and scientific specialist in one, at the present day.

With the extended appreciation of scientific results by the agriculturist, the necessity for a large number of agricultural departments would tend to diminish. The State would be relieved of responsibility. Taxation would be less. The planter does himself what he paid others to do. Men of administrative ability would be required in the various communities to direct local coöperative movements it is true, but they would be entirely unofficial. A priori, one other thing would be necessary. Those who intended to undertake the cultivation of the land, who did so with the fixed intention of discreetly utilizing the knowledge of the specialist, would need to be catered for by the establishment of an inexpensive and easily accessible tropical agricultural university.

### *PROBLEMS IN PROPAGATION BY CUTTINGS.*

Professor Bayley Balfour, F. R. S., delivered as the eighth "Masters Lecture," an extremely interesting and practical dissertation on the subject of propagation by cuttings. The lecture is published in the *Journal of the Royal Horticultural Society*, Vol. XXXVIII, Part 3.

Professor Balfour commenced by raising the question as to

the truth of the commonly made statement that many plants cannot be propagated by cuttings. In the course of the lecture it is made evident that in the light of modern investigation this statement is unjustified. Two remarkable cases are cited early by way of illustration: one being the case of a species of *Gypsophila*, which was formerly believed to be unresponsive to vegetative propagation, but which had been shown by the author to be easily reproduced by internodal cuttings. The second case concerned a plant of great importance in the tropics—the bamboo—which until recently had been considered only sexually reproducible. Professor Balfour, however, has shown the bamboo to be readily increased by cuttings.

Proceeding next to general considerations of the most interesting nature concerning plants as individual organisms, it is pointed out that a plant, unlike one of the higher animals is not, strictly speaking, one individual. It is a colonial organization. "A plant is composed of a sheet of protoplasm (living substance) stretched over a skeleton." A limb of a plant can be removed and another will grow to replace it; if the limb of an animal be removed, only mutilation can result. A plant is therefore potentially immortal.

Two common instances of vegetative reproduction in nature were next cited—those of the iris and the strawberry. The former plant creeps along under the soil forming new additions to its body: in fact it is an accident if the plant does not continue to live for ever. In the case of the latter example, the plant extends itself by runners—by the formation of roots near the terminal bud at the end of the prostrate offshoot.

Consideration of these two cases shows that the necessary conditions for reproduction are (a) that the young buds which give rise to the new shoot must receive ample food-supply from the parent plant until it has rooted itself; (b) that there be water to stimulate root development. These two facts are of primary importance.

After referring to the advantages that accrue to gardeners from the presence of the bulblets, corms and the like amongst monocotyledonous plants, the author proceeded to the important subject of callus formation in relation to vegetative propagation. The growth of callus consists in the formation of a mass of living cells under the stimulus of wounding. In an ordinary dicotyledonous stem or root it may take origin in the pith, in the medullary rays, in the cortex, or in the active wood cambium, and it forms lobulated projecting masses at the point where it occurs. Callus more rarely forms in monocotyledonous plants—these are content to heal wounds by a cork covering only; when it does appear, however, it arises from the cortex of the stem. Callus formation is a mark of the colonial organization of the plant already referred to. It is associated with the formation of adventitious roots.

In continuation, the lecturer proceeded to contrast the readiness with which can be propagated cuttings from soft-wooded and hard-wooded plants. The difficulty met with in the case of hard-wooded plants is explained by the fact that the absorption of water is less easily effected than in the case of soft cuttings. For other reasons, which are later referred to, resinous plants, and those rich in latex may also be difficult subjects for propagation by cuttings.

After pointing out the nature of the development of a dicotyledonous cutting, the question as to whether it is advisable to remove the leaves at the base of a cutting is referred to. It is pointed out that the practice of leaving them has these advantages: (a) the cutting is saved the healing of the wound caused by their removal; (b) the lower leaves sunk in the soil may root like the stem and aid, thereby, water absorption; (c) the lower leaves will aid in the manufacture of food for the cuttings. Another point considered was the fact that some plants propagate far more readily if the cutting be made through an internode than through a node, and vice versa. As an illustration, *Clematis* cannot be propagated if nodal cuttings are used, whereas internodal cuttings may be "struck" within a fortnight. It is indicated that an investigation of the causes of such differences in cuttings is one of the problems of propagation which yet remains to be solved.

Alluding again to callus formation, the interesting and extremely important feature was noted that, however difficult it may be for a cutting to strike, yet once callus is produced, root development can always be stimulated by paring this callus.

After referring to the importance of the size of cuttings illustrated by the fact that small cuttings of hard wood plants germinate quicker than large ones, the lecturer dwelt upon the significance of resin in relation to propagation. When, for instance, cuttings are taken from coniferous trees, the shoots instead of producing callus, generally excrete resin. This flows out copiously over the surface, covering it effectively with a hard skin, thereby constituting a hindrance to the exit of young rootlets. It is necessary not only to remove this resin but to check its exudation. This can be done by plunging the cut end of the cutting in nearly boiling water. The cut resin canals are thus sealed and doubtless at the same time the heat stimulus promotes formation of callus. Dicotyledonous plants with resinous and milky juice are in like case with coniferous, and require to be treated after the same fashion.

The actual state of a shoot to be used for a cutting was another point taken for consideration. A vigorously growing shoot removed from a plant and at once placed in the nidus for propagation may fail to "strike." Its vigor is probably too great. The

soundness of the practice of allowing some cuttings to dry slightly before planting in soil is clearly supported by this interesting feature of development.—*Agricultural News*.

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RECENT WORK ON THE PARASITES BELONGING  
TO THE GENUS *GLOMERELLA*.

Of recent years problems in mycology have been regarded from a much wider point of view than was formerly the case. Particularly is this so in respect to that branch of the subject known as parasitology. As an illustration of this new phase, the work of Shaw in India on *Rhizoctonia* may be cited, and as a still later example, may be mentioned the recent work on the parasites of the genus *Glomerella*, conducted by C. L. Shear and Anna K. Wood of the United States Department of Agriculture. A complete account of this latter investigation has just been published as Bulletin No. 252 of the Bureau of Plant Industry, and from this interesting and important paper most of the information in the following article has been abstracted.

The name *Glomerella* is applied to the ascogenous forms of *Gloeosporium* or *Colletotrichum*—form-genera of the fungi imperfecti, the parasitic nature of which is well known in the West Indies. The objects of the work under review were to study the production of the ascogenous stages, and to determine the habits and identity of the numerous forms of *Gloeosporium* and *Colletotrichum* found upon the same hosts, and upon different hosts. The method of study adopted was to observe the behavior of the different forms in the moist chamber and in pure culture, and to carry out a large number of cross inoculation tests to find out whether a so-called species of *Glomerella* found on one host, say on the cotton plant, could infect another host, say the avocado, on which a supposed different species of *Glomerella* was regarded as being individually parasitic. Apart from its general interest, the economic value of such an investigation is readily apparent.

With particular reference to the life history of *Glomerella* it is important to understand that until recently, the two principal spore forms, conidia and ascospores, have been described and treated as distinct organisms. As is already pointed out, the conidial forms are well known under the name of *Gloeosporium* or *Colletotrichum*. The essential feature of the work under review is that ascospores, conidia and chlamydospores or appressoria (resting-spores) are shown to be normal stages in the life-history of the genus. These facts greatly simplify the generic classification of the forms.

In regard to the thirty-six hosts—of which the names of some are given later—that have hitherto been considered as being

attacked by thirty-six different species of *Glomerella*, it has been found that neither morphological nor physiological differences can be observed which are sufficiently constant to be regarded as specific characters. All the different forms have been referred by the authors to three species of *Glomerella*: *G. cingulata* which occurs on thirty-four of the hosts, *G. gossypii* on one (namely, cotton), and *G. lindemuthianum*, on one.

*G. cingulata* is exceedingly variable in all its characters. The cause of this variability is not yet clear. The essential point about this fungus is that it can often be found to grow from apparently healthy tissue, which has been washed in corrosive sublimate. The explanation is that the chlamydospores send a germ tube down through the epidermis of the host plant, which lies quiescent until the plant becomes weakened from some physiological cause, when the fungus begins to develop as a vigorous parasite.

It is stated by the authors: "Inoculation experiments with fruits have shown that most of the forms from different hosts will produce the characteristic *Glomerella* rot on fruits of other hosts. It is also shown that there is a great variability in the virility of different races or strains of the fungus from the same host. In one experiment races from the lemon, grape and fig produced more serious cases of bitter-rot of apple than a race of the fungus derived from apples. These facts are of great importance in connection with the selection and production of disease-resistant varieties of plants."

It may be added, further, that this is of immense importance in regard to mycological legislation, in view of the fact that the disease can apparently spread as easily from temperate countries to the tropics, as within the tropics itself. It must also be remembered that *G. cingulata* can also be carried by any one of thirty-four different species of agricultural plants, including such diverse forms as palms, oranges, apples, gooseberries, cacao and arrowroot. Of great economic significance is the fact that one species of *Glomerella* is confined to cotton. This species, it may be added, occurs in the West Indies and causes the well-known disease, anthracnose.

The production or non-production of the perithecial stage of *Glomerella* appears to be a fairly well-marked hereditary race character. There is no evidence to show that the production of perithecia is controlled by any of the ordinary conditions of nutriment or environment, though accurate investigation along this line would possibly lead to results of great importance.

In conclusion, the methods of controlling *Glomerella* may be briefly summarized as follows: (1) spraying with Bordeaux mixture; (2) selection of fungus-free seed—particularly valuable in the case of cotton; (3) eradication and destruction of dead and diseased parts of infected plants.

The selection and breeding of resistant varieties may also be practicable in some cases.—*Agricultural News*.



*GOOD ROADS AND THE ELWELL LAW.*

By SENATOR JAMES T. ELWELL of Minneapolis.

The Elwell Road Law was enacted for the purpose of building leading roads throughout the State of Minnesota, and to do it in a large and comprehensive manner, so as to connect city with city, and village with village, and to give to the citizens of each county easy access to their market towns.

The general plan embodies the idea of getting into one lump sum for each county of the state, enough money at one time to build the main arteries of travel for each county.

By its provisions any county in the state may build \$200,000 worth of good, permanent road which will not only aid the farmers of such county in getting to their market town, but will also be an example to them of the kind and character of road which can and should be built to connect with these main arteries.

GENERAL PROVISIONS ARE SIMPLE.

The general provisions of the bill are simple, although the machinery is quite lengthy and explicit, as that feature of the bill is provided for by adopting the main features of Chapter 230 of the 1905 Ditch Law. Under the provisions of the Elwell law, the state pays one-half the cost of the road, the county one-quarter, and the benefited property the other quarter, each having ten years in which to make their respective payments. The county is made the financial agent and it issues the bonds or certificates of indebtedness of the county payable in from one to ten years for the entire cost of any and all roads to be built within the county limits, thus providing for the payment of any and all roads to be built under this law.

Each road or system of roads to be built will have the advantage of having the cash on hand to pay for the improvements as they are made.

All roads, after a careful survey and proper advertisement, will be let to the lowest bidder who will give the proper bonds assuring the county and the State Highway Commission that the work will be done satisfactorily, and in accordance with the plans and specifications of the State Highway Commission.

It is expected under this plan of procedure to interest large contractors who have the proper machinery and equipment of every kind for grading and building roads, thereby saving the county under our present plan of building roads from  $33\frac{1}{3}$  to 50 per cent. The time has passed when the farmer desires to work on the road, as he can make more money by attending to his farm duties, and the man of large experience with proper machinery can do the work for from one-third to one-half of what it will cost the farmer to do the same work.

Then, too, the large contractor with his heavy machinery traveling over the road while it is being built, will be able to roll down a new road so that when completed, it will be as compact and as good for travel and heavy hauling as an old road. This has already been demonstrated under the provisions of the Elwell law in Winona county where the first contracts were let for practically \$116,000. The contractors have demonstrated that they can haul, with their up-to-date machinery, gravel and road material for from ten cents to thirteen cents per yard per mile, when the hauling from the same pits and under like conditions costs from thirty-five to fifty cents to haul with teams.

The large contractor has the advantage of using his heavy machinery 23½ hours out of 24 each day without crippling the efficiency of his plant; and where all of the material is handled with steam shovels, and wide-tired wagons with self-dumps, it can readily be seen it is easy to do this work for from one-third to one-half the ordinary cost and yet be able to pay his men who do the work large enough wages to satisfy them and to insure their earnest and faithful coöperation in completing the work.

#### PROCEDURE UNDER THE LAW.

In proceeding under this law; first enlist the coöperation of the County Commission by petition or otherwise and make a preliminary survey which need not be expensive, by a competent engineer and file this preliminary estimate of the cost of the improvement with the County Auditor, and a copy of the same should be filed with the State Highway Commission. The County Commissioners should then approve the road. afterwards, the Highway Commission approving same.

The next step would be for the final survey of the road which could be made by the State Engineer or by a competent engineer whose work would meet with the approval of the Highway Commission.

After a proper hearing before the County Commissioners, and a determination to build the road, viewers are appointed by the County Commissioners to spread the assessment of one-quarter of the cost of the road. These viewers are three in number and must be men who are not in any financial way interested in the construction of said road. The assessment may be spread in the discretion of the viewers any distance which is proper and right and where they think there is benefit.

#### PLAN FOR NORTHERN MINNESOTA.

In Northern Minnesota, the general plan is to spread the assessment three miles either side of the center of the road, and on a good gravel road, costing \$1,500 per mile, the assessment averages

one cent an acre per year for each of the following ten years with interest on same.

A good gravel road costing \$1,000 per mile with assessment spread two miles either side of the center of the road would be the same amount, or, if spread three miles would be less than three-fourths of a cent per acre.

No farmer that we have ever seen has objected to the amount to be assessed against his land under the provisions of this law when he knew exactly the amount which would be assessed to him for benefits, as in nearly all cases this kind of a road would save him in hauling his produce to the market several times its cost each year, besides the added pleasure of driving over a good road.

#### EVERYONE INTERESTED IN ROAD.

One of the good features in this road law, is that everyone is interested in its cost and construction. The state, because it pays one-half; the county, because it pays one-quarter; the individual benefited and living near the road, because he contributes his share of the last quarter of the cost of the road.

With everyone interested, with money in hand to pay for all work when it is completed, a good road should be built at the right cost.

#### WHAT MAY BE DONE UNDER LAW.

Finally to sum up what may be done under this law, the State of Minnesota is at the present time able to build \$21,000,000 worth of good road, or more than \$200,000 worth of good road in each and every county of the state, and if we put into operation this law to its fullest extent, we double the value of every acre of land in the state, provide ourselves with all the main roads necessary, and make Minnesota a leader in good roads.—*North Woods.*

#### RUBBER-VINE CULTIVATION IN THE BAHAMAS.

It is mentioned in the *Journal of the Royal Society of Arts* for April, 1913, that an extensive cultivation in the Bahamas of the rubber vine *Cryptostegia grandiflora* is in contemplation. It is understood that approximately 5,000 rubber vines will be planted to the acre. After six months' growth the rubber vine is said to attain a length of 12 to 30 feet. The vines will be cut in about twelve months, when there will be presumably about 2 lbs. of shrub to the plant as a minimum, yielding about 2 per cent. of rubber, or 200 lbs. to the acre. According to the American Consul at Nassau, a large number of shoots to be planted in the Bahamas have been ordered from Mexico, and special machinery for extracting the rubber and fibrous by-products by a secret process has been ordered from the United States.

The rubber juice is contained chiefly in the lactiferous ducts of the bark, but to some extent also in the wood of the stem—in fact, the entire plant contains a certain amount of rubber. While the process of extraction is secret, yet in the main, it appears that it is analogous to the production of sugar from the sugar-cane.

The fibrous by-products of the rubber vine are considered as possessing an importance possibly greater even than that of the rubber itself. The bark of the vine yields 6% of the weight of the whole stem, and is a pure cellulose fibre, having a silky lustre comparable to Japanese ramie fibre and almost equal to cotton. It is thought that it can be used as a substitute for Egyptian cotton, especially in the manufacture of fine underwear and other articles. The pods of the vine besides containing a fair percentage of juice, have large quantities of silky cotton such as would be suitable for stuffing pillows; when refined and specially treated, it can be successfully spun with ordinary cotton. The woody substance of the vine, when bleached and worked out, yields a fibre suitable as paper pulp. The vine can be best harvested after the fruiting period.—*Agricultural News*.

## LONDON OFFERS GOOD CHANCES FOR PROMOTION.

(Honolulu Star-Bulletin.)

According to the printed matter issued relating to the Fourth International Rubber and Allied Industries Exhibition, and the First International Cotton, Fibers and Other Tropical Agricultural Products and Allied Industries Exhibition, to be held conjointly in London from June 24 to July 9, 1914, both days included, every opportunity will be given to each country exhibiting to obtain individual publicity in special ways. Thus it is stated:

"Special rooms will be provided for demonstrations, lectures, addresses or other functions, as well as theaters for moving pictures showing the production, packing, shipping and manufacturing of the crude products for commercial use. In all cases the films must be supplied by the exhibiting countries. Particular mention is made of the fact that no charge will be made for these concessions.

"The exhibition permits of the display of every description of commercial products grown in the soil, also of the allied industries, as well as manufactured products, machinery and appliances.

"Many of the British and foreign governments, also associations, companies and firms, have intimated their intention of being represented in the various departments.

"All countries exhibiting, whether through the governments or associations, have the privilege of issuing special invitations to the press, to those interested in their respective countries and to

any others they may desire to invite, when special addresses may be given on the resources and attractions of the country and that particular day will be known by the name of the country. For instance, 'Ceylon Day,' 'British Malaya Day,' 'Brazil Day,' etc."

If Hawaii be represented, there will be "Hawaii Day," of course, when Bonine pictures of Hawaiian industries and scenic attractions should be given. Artist Ilitchcock, on being asked by one of the Hawaiian members of the honorary advisory committee, has stated that he would be very pleased to send some of his paintings of Hawaiian scenes to the exhibition. Members of that committee selected from Hawaii are Wilbur A. Anderson, secretary of the Hawaiian Rubber Growers' Association; Dr. E. V. Wilcox, special agent in charge of the Hawaii Agricultural Experiment Station; F. T. P. Waterhouse, secretary of the Waterhouse Co., Ltd.; Albert Waterhouse, president of the Waterhouse Co., Ltd., and member of the board of commissioners of agriculture and forestry; W. P. Thomas, pineapple grower and packer; Jared G. Smith, tobacco grower and formerly special agent in charge of the H. A. E. S.; William Weinrich, fiber expert, and Daniel Logan, editor *Hawaiian Forester and Agriculturist*. Mr. Anderson is also officially listed as one of the patrons of the exhibition, along with the Earl of Derby and many other distinguished persons and associations throughout the world.

### RUBBER IN HAWAII.

In a report by the Acting British Consul at Honolulu on the trade of Hawaii in the year ended June 30, 1912, which will shortly be issued, it is stated that rubber is steadily becoming a more important item of Hawaii's products. On the Island of Maui many trees have been planted, and these are now tapped in large numbers. Steady efforts are being made to improve the methods of preparation in order to increase the marketable value. During 1912, 35,000 were tapped, and altogether some 8,000 lbs. of rubber were expected to be produced, most of which will be exported. For 1913 an output of 20,000 lbs. is anticipated. Attention has been directed to an indigenous rubber tree (*Euphorbia lorifolia*), which grows in several localities, one place in particular on island of Hawaii having 6,000 acres, averaging 75 trees to the acre, whose product is 14 to 17 per cent. of rubber and 60 per cent. of resin (chicle). It is reported that the latex contains 42 per cent. of solid material, and that one man can collect 16 to 30 lbs. of crude product per day.—*Financier*, April 1.

## THE KALO IN HAWAII (II).

By VAUGHAN MACCAUGHEY and JOSEPH S. EMERSON.

## 3. THE FLOWER.

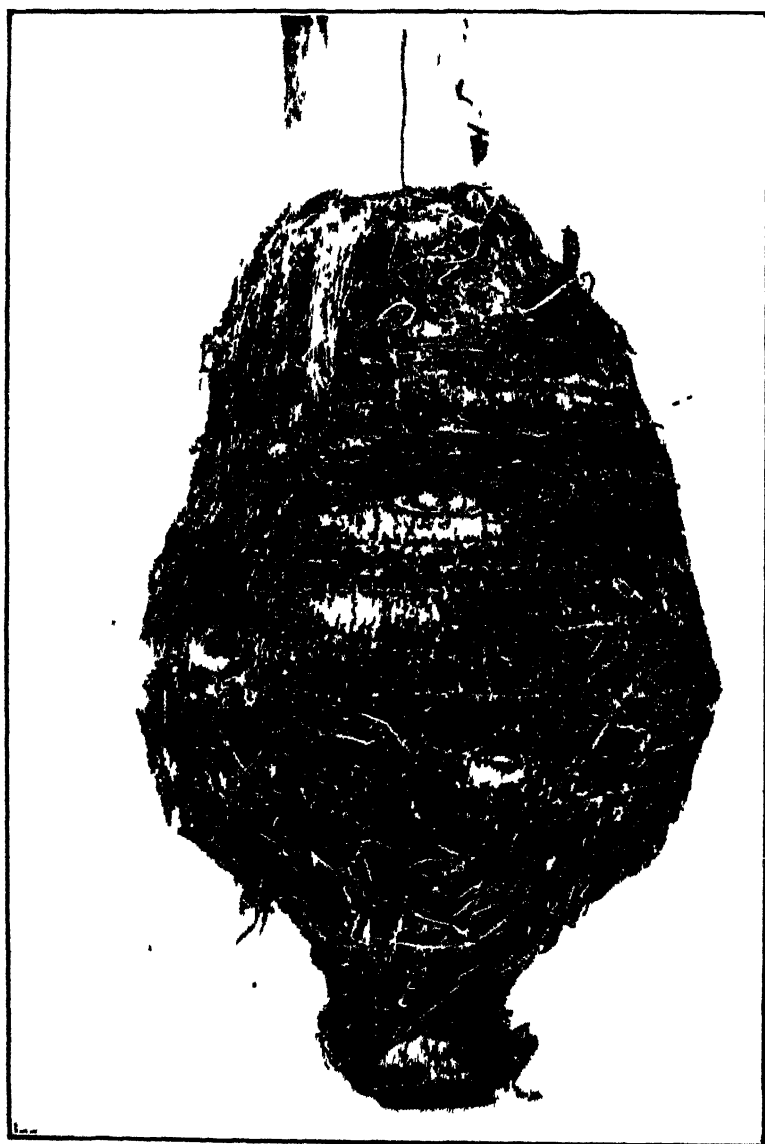
The production of flowers and seeds is uncommon in the case of the kalo plant. Like many other tropical plants, it has come to rely upon asexual, rather than sexual, methods of propagation. The plant develops vegetative rather than reproductive tissue. Plants that have a similar habit are banana, sugar cane, sweet potato, breadfruit, and *hau* tree. It is probably desirable, from the standpoint of the economics of the plant body, that flowering and seedage be suppressed, in such plants as the kalo. The part of commercial value is the corm, a vegetable part, which would suffer if material were drawn from it to nurture flowers and seeds.

When blossoming does occur in the cultivated kalo, the flowers appear shortly after the *huli* have been planted, and frequently before the leaves have appeared. In the wild kalo, flowering, if it occurs at all, is deferred until very late in the life of the plant. By *huli* is meant the large central bud that is cut from the top of the corm, together with the adjacent leaf-petioles, and is used to propagate the plant. This is the common type of *huli*; others are discussed under Propagation.

The flower arises, as do the leaves, from the center of the leaf cluster. It is yellowish or creamish in color, and resembles in shape and structure the calla lily or the *Monstera* flower. The central club-shaped order, or spadix, is enclosed by the pointed, hoodlike cover or spathe. The spadix bears the many small florets, staminate and pistillate. The extreme tip of the spadix is sterile, and is usually closely confined by the strongly twisted spathe. Fertile seeds rarely develop. The method of pollination is not known. It is interesting to know that the flowers of plants closely related to the kalo are pollinated by snails.\*

Interesting contrasts will be discovered if one makes careful observations of the flowers of some wind-pollinated plant, such as sugar cane, bamboo, corn, sorghum, grass, coconut palm, and some insect-pollinated flowers, such as those of nasturtium, hibiscus, *hau*, *lehua*, and compare these with the kalo flower.

\* The only snail occurring in the kalo patches of Hawaii is a large aquatic snail imported by the Chinese in recent years.



CORN OF *PI'ALI'I ULALUA*.

Weight, 915 grams; dimensions, 16.5 cm. long by 11 cm. diam. This is a type of corn found commonly in the markets.

## 4. THE CORM.

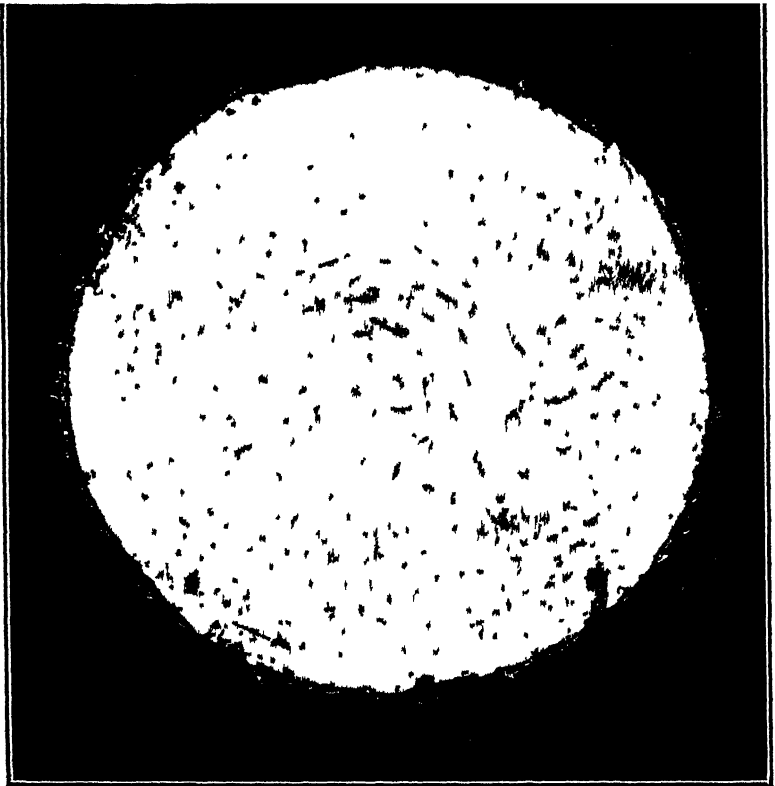
It is for its starchy corm or "root" that the kalo is chiefly raised, although other portions of the plant have some value as food. A full-grown corm of average size is as large and as heavy as a large sweet potato. It is covered with a fibrous or scaly bark, especially towards the summit. Just beneath this outer bark is an inner layer, which may be white, rose, greenish, or purplish in color, depending upon the variety. The interior of the raw corm is usually light gray with a slight bluish tinge, but in some varieties may be yellow, orange, rose, or even purple.

For many years the acrid or toxic effect of certain aroids was not understood. Professors Pedler and Warden, of the Department of Chemistry, Calcutta University, first demonstrated the presence and action of the calcium oxalate crystals. The following excerpts from their paper in the *Journal of the Asiatic Society of Bengal*, Vol. 57, Part II, No. 1, for 1888, prove of interest in this connection. Their experiments were performed upon *Colocasia virosa* Kunth, which at that time was called an *Arum*. After prolonged and varied chemical tests they stated that "The examination of the ash thus failed to afford us any clue to the physiological action of the fresh tubers.

"It now occurred to us that possibly the painful effect produced by *Arum* when in contact with the tongue, etc., might be due to mechanical causes. A microscopic examination of a section of a tuber revealed the presence of very numerous bundles of needle-shaped crystals, and we also found similar crystals in the leaves and stems. These crystals were seen under the microscope to be insoluble in cold acetic acid but easily soluble in cold diluted nitric or hydrochloric acid. \* \* \* There appears to us to be no reason to doubt the fact, that the whole of the physiological symptoms caused by *Arums* are due to these needle-shaped crystals of oxalate of lime, and that the symptoms are thus due to purely mechanical causes. Bearing in mind the action of re-agents on calcic oxalate, the reason why mere boiling in water failed to deprive them of their activity is explained by the insolubility of oxalate of lime in water. Again, the action of dilute acetic acid, even at temperatures of 100 degrees C., in slightly lessening the activity of the tubers, is due to the very slight solubility of oxalate of lime in that acid. And, lastly, the complete loss of all physiological action when the tubers were treated with dilute nitric or hydrochloric acid is evidently due to the ready solubility of calcic oxalate in those mineral acids. And these assumptions, as we have already indicated, were fully demonstrated by the microscopic examination of sections of the tubers treated with the re-agents we have mentioned. One point, however, remains to be explained: we observed that, on drying, the tubers lost practically the whole of their physiological activity. Clearly there



could have been no loss of oxalate of lime on desiccation, and, as a matter of fact we found as many crystals on microscopic examination of dried *Arums* as we had found in the fresh tubers. We explain this apparent anomaly in the following simple manner. In the fresh condition of the tubers, the bundles of crystals of oxalate of lime are cone-shaped, more or less, the sharp points covering a wide area, and forming the base, but in the drying of



#### STRUCTURE OF THE KALO CORM.

Transverse section through a corm of *Piperia uluala*. The starch-containing parenchyma is quite moist, and very firm. The bark is both scaly and fibrous. The laticiferous tissue is conspicuous

the tubers, the needles appear to arrange themselves more or less parallel to one another, and the sharp points thus cover a smaller area. And thus, instead of each crystal acting as a separate source of irritation and penetrating the tissues, the bundles act as a whole."

The acrid effect of the crystals, or raphides, is destroyed by drying, boiling, or steaming the corm.

Upon the outer bark may be seen the scars of former leaves. From these scars the roots commonly emerge. Small roots may be seen in the axils of the leaves still present if these leaves are pulled downward so as to expose the corm. The roots themselves are coarse, rather long and string-like, somewhat brittle, and whitish in color. "They contain little of the milky latex which fills most of the other organs of the plant."—Barrett. The roots bear a few branching rootlets. Kalo is not especially deep-rooted.

Young kalo plants sometimes develop from underground root-like runners sent out from the corm. Plants may also develop directly from the corm by budding. These lateral offspring are called *huli ohá*, or *huli pu'u*, and are described under the head of Propagation.

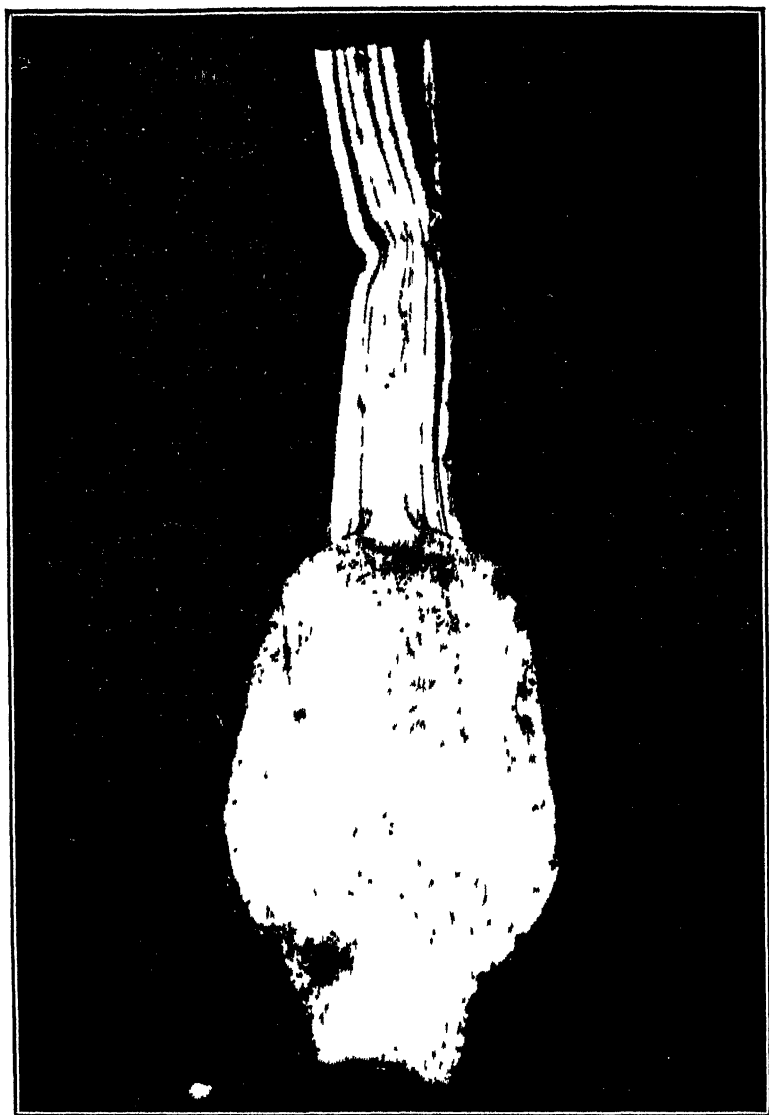
The corm, which because of its subterranean position is commonly thought of as a root part, is really a modified stem, as is demonstrated by the leaves which it bears. True roots do not bear leaves. Its swollen shape is due to the fact that it is stuffed with starch, which is the food part. Other familiar plants that store up large quantities of starchy or sugary material in their stems are: sago palm, cycads, sugar cane and potatoes.

This stored food is protected from the attacks of animals by its secure position within the wet soil, by the outer husk or bark, and by the protective layer of minute, needle-like crystals of calcium oxalate. These occur both in the leaves and in the outer layer of the corm.\* Anyone who has inadvertently eaten kalo that has been insufficiently cooked, can attest to the prolonged and sharp prickling irritation, as though one's mouth and throat were veritably "full of needles."

## 5. BOTANIC STATUS OF KALO.

The botanic name for kalo is *Colocasia antiquorum* var. *esculenta* Schott. This means that it is a member of the genus *Colo-*

\* The use of root crops as food by primitive peoples is interestingly described by O. F. Cook as follows: "The root crops that were domesticated in America stand in distinct contrast with Old World root crops, both in number and in quality. The species cultivated in the Old World were relatively few, mostly the seed-propagated garden vegetables of temperate regions, such as radishes, turnips, beets, parsnips, carrots, etc. The temperate root crops domesticated in the Old World were mostly capable of being eaten raw, as though they had been used first by people unaccustomed to use fire for cooking vegetables. The root crops that were domesticated in America are not eaten raw by the natives. Many of them are disagreeably acrid in the raw state, like the aroids, or even positively poisonous, like the cassava. Very few new types of plants appear to have been domesticated as root crops in the Old World Tropics, and none of them have attained the prominence of several of the American species. The banana appears to have been cultivated first as a root crop, and some of the varieties are still cultivated for their root-stock in New Caledonia and in East Africa."



#### STRUCTURE OF THE KALO PLANT.

Longitudinal median section, through petioles and corm. The marks in the corm are due to the latex, which turns brown when the latex tubes are cut and exposed to the air. Note the triangular mass of embryonic tissue, centrally located amidst the bases of the petioles. From this region the foliage and floral organs are produced. This kalo is *Pi'ali'i ulaula*.

*casia* (which is the old Greek name for plants of this general type). The specific name *antiquorum* indicates the antiquity of its cultivation, for kalo was among the plants first used by mankind for food.

There are several varieties of this species, as shown in the botanic synopsis given later. The kalo of Oceanica and Hawaii is the particular variety *esculenta*, so-called because of its extensive use as food. The botanic name for kalo was given it by the German botanist Heinrich Wilhelm Schott, who lived during the years 1794-1865, and who made a careful study of the plants of this group.

The Hawaiians had a number of poetical appellations descriptive of the kalo. Among these is "*ka i'a iwi ole*," which means "the fish without bones." This refers to the importance of kalo in the diet—it held the same high rank among the vegetable foods that fish held among the flesh foods.

### SOME SUGGESTIONS REGARDING THE CARE OF MILK AND CREAM IN THE HOME.

(Press Bulletin No. 42, the University of Nebraska Agricultural Experiment Station.)

By J. H. FRANDSEN.

Sanitary milk is milk produced from healthy cows under conditions which prevent all outside contamination. The production of clean and healthful milk is the most important subject with which the dairyman has to deal. Considered from an economic standpoint, we find milk produced under absolutely sanitary conditions selling for practically double the ordinary price. Needless to say, for the production of sanitary milk the dairyman must have healthy cows, a sanitary barn, clean bedding, dust-free air, a clean barnyard, and clean cows. He must have clean and healthy milkers, clean milk vessels, and pure water. He must feed clean, wholesome feeds and must have a sanitary milk-room and abundant facilities for cooling the milk and cream. However, if carelessly handled in the home the milk or cream may quickly become unfit for food. The fact that such large quantities of good milk have been spoiled in the home by improper treatment after delivery prompts the writer to emphasize some of the points regarding care of milk and cream in the home.

Milk and cream readily absorb odors and collect bacteria and other impurities whenever they are exposed to the air or placed in utensils that are not scrupulously clean. If this fact is generally understood it can easily be seen why it is so objectionable to store uncovered milk in refrigerators or cellars, where it comes in contact with vegetables or other food products possessing

strong odors. Milk is almost a perfect food for human beings. It is also a perfect medium for the development of certain bacteria which may gain access to it from the dust-laden air, from flies, and from unclean utensils. Some of these bacteria may be the germs of contagious diseases; others may cause digestive disorders, especially in infants and young children whose diet is largely milk.

Experiments have shown us that many germs which gain access to the milk develop very rapidly while the milk remains warm. By this we mean at a temperature above 50 degrees Fahrenheit. For instance, milk kept at 45 degrees F. may be kept perfectly sweet for twenty-four hours, while if kept at a temperature of 70 degrees F. it may sour in less than six hours. This emphasizes the importance of low temperatures in the preservation of milk and cream.

The following brief rules should enable the consumer so to care for the milk as to have an article that is at all times sweet and wholesome:

1. If possible, purchasers should insist on getting milk in a bottle or other originally sealed package. Milk dipped out of a can in the street may gather large numbers of bacteria from the dust and impurities in the air falling into it.

2. Never allow the milk to stand in a warm place for any length of time, but place as soon as possible in a refrigerator, ice box, or other cool, clean place.

3. Keep the milk or cream in the original package until needed for use.

4. Carefully wipe the mouth of the bottle before pouring milk or cream from it.

5. Do not pour back into the bottle any milk which has been exposed to the air.

6. Keep the bottle covered with a cap or an inverted tumbler as long as any milk remains in it.

7. Do not expose uncovered milk in refrigerators containing foods having a strong odor.

8. Wash milk bottles as soon as empty and do not use milk utensils for any other purpose.

9. Wash milk bottles in pure water and do not wipe with dish towel. It is better to scald them in clean water and set away unwiped to dry.

10. Special precautions should be taken with the baby's milk bottles. They should first be rinsed in lukewarm water, then washed in hot water containing a little soda, and then scalded. In selecting a feeding bottle, choose one with a wide mouth and no corners. Never use rubber tube between the bottle and the nipple.

11. In case of contagious diseases in the house, such as typhoid, scarlet fever, or diphtheria, return no milk bottles to the milkman without the permission of the health officer.

### ADVANTAGES OF GOOD CULTIVATION.

Mr. B. G. Brooks, Instructor in Agriculture, has contributed the following article to the *Queensland Agricultural Journal* of February, 1913:

In the successful raising of farm crops the management of the soil is of the greatest importance. It is only necessary to observe the variations in the yield of similar crops on adjoining fields to find that, were up-to-date methods more generally practised in the preparation of the soil, the returns per acre would be materially increased.

When a crop fails the cause is, unfortunately, too often set down to adverse climate conditions. Although the weather has undoubtedly a very important bearing upon crop production, yet it is not always responsible for the poor returns.

In my travels throughout the various districts of the State, I have ample opportunity of studying the respective methods practised in the raising of crops and the results obtained thereby.

It is not an infrequent occurrence to come across a farmer harvesting a very heavy crop on one side of the fence, while his neighbor on the other, on similar soil, is reaping practically a failure. It is, therefore, necessary to look to some cause other than the weather for this disparity. Perhaps there is some truth in the remark made by the farmer who was harvesting a fine crop while his neighbor was reaping a poor one. When asked the reason for the difference, his reply was, "I cultivated my soil—my neighbor irritates his."

The problem relating to soil fertility and crop production has received much attention from agricultural scientists during recent years, and although much has been achieved, there still remains a very large field for investigation. Much prominence has been given, both in Australia and America, to the raising of crops with a minimum amount of rainfall, and it must be admitted that marvelous results have already been secured by the adoption of the methods advocated.

The foundation stone upon which the success of the dry-farming system rests is fallowing—that is, keeping the soil cultivated and only taking a crop every alternate year.

So far, fallowing has received little or no attention in our State. On the other hand, the practice of securing two crops during the year is quite a general one, and this is undoubtedly, to a large extent, responsible for the low average yield obtained from some of our staple crops. I find that one of the most important factors in successful crop production is the early preparation of the land,

but, with the system of double cropping just mentioned, this cannot be given effect to. I am not inferring that cultivation is carried out in a slipshod manner, for it may be that every care has been taken in plowing and pulverizing the soil to form the necessary seed bed, but, unless a certain period is allowed for the soil to "mature," or, in other words, to permit of the necessary plant food becoming available for the needs of the crop, it is impossible to secure a full return.

This point is not at all difficult to demonstrate. It is only necessary to take a quickly maturing crop, such as *Panicum*, and watch results. As an example, I will relate one experience of many I had, showing the effect of early and late preparation. In a field of 30 acres, 10 were plowed four months; 10, two months; and 10, just previous to planting. The whole area was planted with *Panicum* at the same time. The result in green material cut for silage was: for the four months, 12 tons per acre; for the two months, 6 tons per acre; and for the portion plowed previous to planting, nil.

Although the weather was very favorable during the growing period, the seed on the freshly plowed area practically refused to germinate—only a few small patches appearing where timber had been burned off. This failure of seed to germinate when sown in newly-plowed land, more especially where the soil is of a stiff character, has often been observed. Germination will eventually take place, but it may be weeks or months later. Numerous examples of a similar nature were to be met with in the 1911 wheat crop, and to a lesser extent during the past season. In every district individual fields were to be met with giving a good yield, while adjoining areas were practically a failure. On investigation it was discovered that, in almost every instance, early preparation of the land was responsible for the successful returns.

### *HAMPTON INSTITUTE'S WORK FOR NEGROES.*

Hampton Institute's remarkable results in training negroes are vividly set forth in the forty-fifth annual report of the principal, just made public. From a school of 15 pupils and two teachers, the Institute has grown into a busy educational village of over a thousand persons, with a far-reaching influence, not only for the races it is designed to aid, but for the whole nation, which benefits by the splendid work and example of Hampton graduates everywhere.

Industrial training is the keynote of the Hampton success, according to Dr. P. P. Claxton, United States Commissioner of Education, who is keenly interested in the Hampton work. It is noteworthy that this industrial training is of the most immediate and practical sort, applied to the ordinary producing tasks of life,

first of all in the educational plant itself. At Hampton practically all the work is done by the students themselves. There are buildings to be kept in repair and occasional new buildings to be erected; there is a farm of 600 acres to be cultivated, with 150 cows and young stock, 40 horses and mules, hogs and poultry. There are horses to be shod, harness to be kept in repair, wagons to be built, boys to be clothed—these are a few of the industrial opportunities which the plant itself offers. Last year the students received over \$86,000 in wages, of which about one-fourth went to the girls for domestic work in the Institute.

This year the boys of the trade school have built Clarke Hall at a contract price of \$26,142. The work called for the services of bricklayers, plasterers, carpenters, sheetmetal workers, steamfitters, plumbers, cabinetmakers, electricians, and painters. The architect who designed the building, after inspecting the brickwork done by the boys, said it compared favorably with similar work by New York men; and some of the local builders pronounced it the best piece of work done in that section of Virginia.

At Hampton work is considered a privilege; in fact, one form of punishment is the taking away of work from a pupil. No student is ever punished by being forced to work. At the same time, labor is not insisted on as an end itself, but rather as the means to an end. "The aim of Hampton," says Dr. George P. Phenix, vice-principal, "is not merely to train workmen, but to educate men and women who shall stand for the best things in the communities to which they return, and who can make their skill contribute to this end."

#### *MATERIAL FOR MAKING PAPER.*

Wood-pulp is by far the most important material for making paper at the present day, and, owing to the wide distribution of the sources of supply—coniferous trees being the most suitable—it is the cheapest. Large quantities of straw-pulp also are imported into this country for the manufacture of brown papers and straw boards; and bamboo is coming into prominence as a source of paper-pulp. A new material for making paper, "elephant-grass," from Uganda, is now suggested in an interesting article published in the current quarterly issue of the *Bulletin* of the Imperial Institute. This is a perennial grass, growing usually to a height of 6 ft. to 10 ft., and much higher on rich marshland. Occurring in a deep zone across tropical Africa, it is found chiefly along watercourses and in marshy depressions; but it grows also in the more open parts of bush and forest land. Both cattle and horses eat it readily. A sample of the dried mature grass was sent recently from Uganda to the Imperial Institute, with the object of ascertaining its suitability for the manufacture



of paper. The Chief Forestry Office of the Protectorate stated that the grass was a source of annoyance and expense to agriculturists, as it grew rapidly after the aerial shoots had been burnt or cut down; but that, if it could be used profitably for the manufacture of paper, a new and large industry could be built up. Since this grass is available in immense quantities, and at present has to be burnt each season in order to keep it down, it is important to find a commercial use for it.

The consignment, which weighed 177 lbs. when received at the Imperial Institute, and 145 lbs. on being air-dried, yielded, after treatment in the laboratories, a pulp of good color, composed of ultimate fibers rather longer than those of esparto grass and about the same length as those of bamboo pulp. It furnished a fairly good paper. Owing to the light and bulky nature of "elephant grass," however, it is unlikely that the stems could be shipped profitably to Europe for paper-making; but if the stems were converted into pulp at or near the sources of supply, by treatment with caustic soda, it is possible (in the opinion of experts) that a remunerative industry could be opened up, since the pulp probably would be approximately the same value for paper-making as wood-pulp prepared by the soda process—namely, £7 10s. to £8 12s. 6d. per ton in London (February, 1913). Since there are immense deposits of soda in East Africa which could be utilized for the manufacture of pulp, there would appear to be some prospect of a new industry's growing up in this Protectorate.—*The Mail*.

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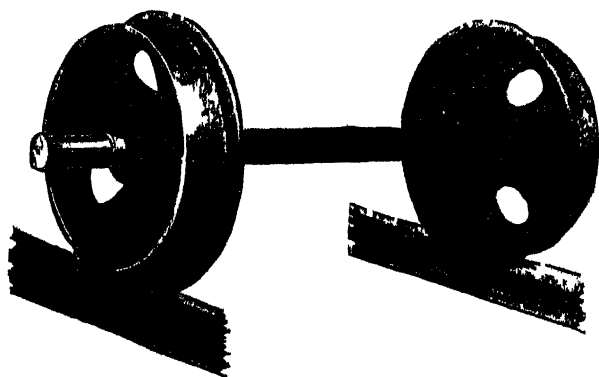
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# THE HAWAIIAN FORESTER AGRICULTURIST

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VOL. X.

SEPTEMBER, 1913.

No. 9.

In this number will be found the detailed reports of President Giffard to his fellow-commissioners of the Board of Agriculture and Forestry, regarding the distribution of the Silvestri fruit fly and horn fly parasites on the different islands. They show just what is being done in the campaign against the pests mentioned. The president is duly cautious in anticipation of results, although adopting a hopeful tone from the history of other parasitical work in these Islands. He points out, however, that it will take time for the parasites to prove their value. It will never do to allow the campaign to be hampered for lack of funds.

The Forester acknowledges with appreciation the receipt of several numbers of Vol. 2 of the Agricultural Journal of the department of agriculture and forestry, Republic of China, printed entirely in Chinese characters excepting a few scientific terms and the captions of cuts, the latter being of imported Hereford cattle, views of forestry work, etc. Before receiving these numbers an item sent from Washington was in type, mentioning that the Chinese republic had established a department of agriculture and forestry. The fact that its journal is in its second volume indicates that the department is coeval in origin with the republic itself.

For the information of new readers, it may be mentioned that the treatise on "The Kalo in Hawaii," by Messrs. MacCaughy and Emerson, began in the July number.

In this number appears for the first time the monthly reports of the Division of Hydrography, which was added to the bureau of agriculture and forestry by legislation of this year. The importance of Hawaii's water resources will place the hydrographic reports among the most interesting and valuable contents of the Forester.

With a distribution of 6150 plants to the public and 25,000 seedlings to planting and other corporations, in the months of July and August, the nursery of the Division of Forestry has well maintained its record of efficiency. The reports of the division

for the two months will show much other work of great value in hand, such as the replanting with the native trees, koa and kukui, of the Tantalus heights, and the assistance being proffered the military authorities in planting trees and ornamental shrubs at army posts.

Few people realize the protection Hawaii receives from the Division of Entomology against the constant invasion of a motley army of pests, which is successfully repelled every month by that branch of the agricultural service. The gravity of the menace can be partly understood from a perusal, month to month, of the category of pests intercepted. How many people stop to think of the consequences should one in a score of those pests pass the barriers?

An important discovery would appear to have been made by the territorial veterinarian with regard to the disease that has been decimating the working mule stock of plantations on Maui. His theory that a parasite derived from impure feed and water is the common cause of cerebro-spinal meningitis and maladies having allied symptoms thereto may, it is hoped, lead to preventive if not curative means that will stamp out all such infection.

In totally eradicating glanders from Waipio valley, Hawaii, within a year past, the Division of Animal Industry has scored a great triumph. It is seldom that such a mess as was found in that region has to be cleaned up.

While reporting that bovine tuberculosis is steadily on the decrease on this island of Oahu, Dr. Norgaard is recommending plans to make the campaign still more effective.

### *DISTRIBUTION OF PARASITES.*

Following is the text of reports by President W. M. Giffard, of the Board of Agriculture and Forestry, addressed individually to the Commissioners, Messrs. J. M. Dowsett, A. H. Rice, H. M. von Holt and A. Waterhouse, relative to the distribution of parasites:

September 11, 1913.

Herewith enclosed I beg to hand you statements of certain distribution of horn fly and fruit fly parasites during the past three months. In view of the fact that the introductions of the original colonies of these parasites were comparatively small I consider that the Board should feel gratified at the success attained in their multiplication in our insectaries. Much time and labor has

been consumed by both Messrs. Fullaway and Bridwell to bring about continued success of the breeding experiments so satisfactorily inaugurated by Prof. Silvestri. The latter entomologist, as you are aware, left for his home in Portici, Italy, in the middle of June and since that time the breeding has been in charge of Mr. D. T. Fullaway, the entomologist loaned the Board by the Hawaii Experiment Station. The necessity of securing additional entomological assistance was at once made very apparent upon Prof. Silvestri's arrival here with the parasites he had discovered in Africa, and for that reason the services of Mr. Fullaway were requisitioned by the Board as above stated.

Owing to an unexpected reduction in the appropriations from which the entomological expenditures of the Board are drawn, it was at first contemplated that we could not continue the breeding and distribution of these parasites beyond September 30, but having interviewed Governor Prear relative to this matter he strongly urged that the Board, if at all possible, continue this special work for another three months. As I deem it of the utmost importance that the multiplication and distribution of these Silvestri parasites should not at this stage of the experiments be stopped, I earnestly recommend continuation of the insectary work until December 31 and continued, if necessary, longer than that period if funds are available.

In the meantime I am notified by Mr. Fullaway that he has been ordered by his station to go to the Philippines on special entomological work for the Federal authorities, and as he will leave for those islands about the middle of next month I have made arrangements to have Mr. Bridwell, one of the Board's entomologists, take charge of the work for the time being. I have no doubt that the breeding of the parasites will continue satisfactorily under his immediate charge.

I also desire to say that, although the enclosed lists of distribution of both horn fly and fruit fly parasites show that apparently large numbers have been distributed to the various islands, it does not necessarily mean that these will all become established. We are already aware of the establishment of one or more of these parasites in localities near Honolulu where we have been able to give close attention to the conditions of host material before liberation, but this in no manner means, as yet, that the establishment is considered quite satisfactory nor that it is in any way general wherever liberations have been made. To ensure success at all (if success is at all possible) many more thousands of each of the parasites will have to be bred and liberated, and if not liberated under the most ideal conditions as to the presence of the host pest in its proper stage of growth there is always a grave chance that the colonies liberated will produce negative results. Neither must it be supposed that a perceptible diminution of the numerical strength of the pest is to be looked

forward to in the very near future. It takes many millions of parasites established generally over all areas to begin to do what may be called effective work, and it takes a year and more often longer to bring about such a condition even if our climatic conditions and general environment are suitable for the multiplication of parasites liberated under natural conditions. The leaf hopper pest was not in any way controlled by parasites until the second year after their liberation and the same can be said of the cane borer parasite, which, although established and doing good work, has not yet multiplied to the extent that is required to make it absolutely effective in all sections where it was liberated a couple of years ago. As I have repeatedly informed the Board and the press, parasitic work both in the field and in the insectary is altogether problematical. To be successful the natural conditions similar to those which the parasite has been accustomed to in its native habitat must be as near perfect as possible, and even then the percentage of efficiency of any one parasite may be quite small, in which case it would necessitate the introduction of other species so that all of these combined could bring the parasitization of the pest up to a satisfactory percentage and make relief perceptible. The fact that Prof. Silvestri discovered in West Africa at least two other species of fruit fly parasites of a different habit of parasitization from those he successfully introduced here is quite encouraging, notwithstanding the further fact that these two species did not survive the long voyage and changes of climate between Africa and Honolulu. As these particular species are reported by Silvestri to be even more satisfactory than those he introduced here, it is to be hoped that the Board's funds will be such that that entomologist may be engaged for another expedition to Africa next year. In the meantime an entomologist under Silvestri's direction began research work on the horn fly and its parasites along the Mediterranean and vicinity on August 1. It is yet too early to report any results as to this feature of the parasitic work.

In conclusion I would say that late advices received from Prof. Silvestri indicate that his official report in the shape of a "Bulletin" will be ready some time next month. As soon as it is received it will be published in bulletin form and distributed.

Yours truly,

W. M. GIFFARD,  
President and Executive Officer Board of Agriculture and  
Forestry.

## DISTRIBUTION OF HORN FLY PARASITES.

(June, July, August and to Sept. 8, 1913.)

*Oahu.*

Honolulu—Manoa (College Dairy).....	32
Manoa (Boyd's) .....	300
Waialae (Isenberg's) .....	200
Sheridan Street (H. D. A.).....	50
Nuuanu (Dowsett D.).....	225
Niu (Lucas' Dairy).....	100
Honouliuli—O. R. & L. Co.....	200
Waianae—Waianae Sugar Co.....	100
Kunia—O. R. & L. Co.....	200
Kawailoa—O. R. & L. Co.....	100
Waima—O. R. & L. Co.....	100
Kahuku—O. R. & L. Co.....	200
Mokuleia—Pond's Dairy .....	200

*Hawaii.*

Waima, South Kohala—Parker Ranch.....	400
Pahala, Kau—Hawanan Agricultural Co.....	400
Kukaiiau, Hamakua—Kukaiiau Ranch.....	200
Hilo—Including Hilo Boarding School.....	300
Keau, Puna—Shipman's .....	200
Naalehu, Kau—Hutchinson Sugar Plantation Co.....	200
Mauka Hoonaunau, Kona—J. Paris.....	400
Puualehua, 4200 ft.—A. Greenwell, Kona.....	400
Puuwaawaa, Kona—Hind's Ranch.....	400
Huehue, 2400 ft., Kona—J. Maguire.....	400

*Kauai.*

Lihue—W. H. Rice.....	300
Wailua Falls—Lihue Plantation.....	200
Lihue Falls—Hills' Soda Works.....	100
Lihue—Lihue Plantation makai field.....	200
Puunana—Grove Farm .....	400
Kilauea—Kilauea Plantation .....	400
Homestead—McBryde's Pineapple Cannery.....	100
Makaweli—Gay & Robinson.....	200

*Lanai.*

Koele—Lanai Ranch Company.....	100
Kopo—Lanai Ranch Company.....	100

*Molokai.*

Kaulawai—Molokai Ranch Co.....	500
Kaunakakai—Molokai Ranch Co.....	100
Kualapuu—Molokai Ranch Co.....	200



Makawao—Haleakala Ranch Co.....	300
Makawao—Ulupalakua, Cornwell Ranch.....	600
Pohakupuli, Lahaina—Honolua Ranch.....	200
Honokowai, Lahaina—Honolua Ranch.....	200
Puuimakaole, Makawao—Haleakala Ranch Co.....	300

## DISTRIBUTION OF FRUIT FLY PARASITES.

(June, July, August and to Sept 8, 1913.)

*Oahu.*

Honolulu—Nuuanu (Gartley's), Chalcids.....	2400
Queen Emma Park, Chalcids.....	50
Moanalua, Proctotrupids .....	4260
Manoa (Cooper's), Chalcids.....	1950
Upper Manoa, Proctotrupids.....	400
Pauoa (Booth's), Proctotrupids.....	400
Wahiawa—Proctotrupids . . . . .	100
Waianae—Australian Opius .....	3

*Hawaii.*

Kona—Chalcids . . . . .	1085
Proctotrupids . . . . .	2080
S. A. Opius.....	3
Australian Opius .....	10
Hilo—Proctotrupids . . . . .	500
Honokaa—Chalcids . . . . .	200
Naalehu—Proctotrupids . . . . .	200

*Kauai.*

Waimea—Chalcids . . . . .	140
Proctotrupids . . . . .	300
Lihue—Proctotrupids . . . . .	500
Hanalei—Proctotrupids . . . . .	100

*Maui.*

Lahaina—Proctotrupids . . . . .	80
Wailuku—Proctotrupids . . . . .	220

## MONTHLY STATEMENT PARASITES LIBERATED.

	Horn Fly	Chalcids	Proctotrupids
June 24-30, 1913.....	80	150	180
July, 1913 .....	2450	1920	2800
August, 1913 .....	6000	2360	4930

## TOTAL NUMBER OF PARASITES LIBERATED.

(May 16th to Sept. 8, 1913, Inclusive.)

Horn Fly .....	9 830
Fruit Fly—Proctotrupids .....	9,140
Chalcids . . . . .	5,825
Opius . . . . .	20
	24,815

DISTRIBUTION OF FRUIT FLY PARASITES BY W. M. GIFFARD IN KAU AND KONA DISTRICTS. LOTS PER MAUNA KEA VIA HILO AUGUST 9 AND PER MAUNA LOA VIA KAILUA AUGUST 13.

*Mauna Kea Lot.*

August 11—W. G. Ogg, Pahala, Kau. Two vials approximately 50 Procs. liberated under two bearing coffee trees in Mr. Ogg's garden. No other fruit present at the time but a few ripe coffee berries.

August 11—George Gibb, Naalehu, Kau. Six vials approximately 150 Procs. liberated under mango trees in his garden. Oranges, limes and mangoes in season but only mangoes found infested. Peach season over. Some coffee coming into season in a few weeks.

August 12—Liberated one vial approximately 25 Procs. on Kona government road about 2 or 3 miles on the Kau side of Iloonaunau among infested guava and coffee.

N. B. Fruit in the Kau district was scarce at this time. Small patches of coffee here and there; will be in season shortly. Not much wild guava fruit seen.

*Mauna Loa Lot.*

August 13—Capt. Cook Coffee Company, Kealahkekua, Kona. Six vials approximately 125 Procs. liberated by the manager (Macfarlane) in the mauka coffee fields of Kaiwaloa at about 1800 feet elevation.

August 13—Robert Wallace, Kealahkekua, Kona. Five vials approximately 125 Procs. liberated by me personally in the Kynnersley field of coffee just mauka of Julian Yates' house at Kealahkekua near government road. In and near this field where I liberated these parasites are numbers of peach trees but not in bearing at this time.

August 14—On the morning of departure for Kau, Mr. Wallace and I together liberated 16 vials approximately 250 Procs. in large coffee field immediately opposite Mr. Wallace's house.

N. B. All the fields where these parasites were liberated con-

tained both ripe and unripe infested coffee berries. The crop in general on or near government road was not yet sufficiently ripe for harvesting although there had been some few small pickings in many fields. In all the fields there were dropped berries in more or less quantities. Owing to heavy rains during visit in Kona I found it impossible to investigate the "Opus" experiments. Mr. Wallace, however, assured me that instructions as to placing and taking off the nets on the trees had been complied with. As a matter of fact too short a time had elapsed since the liberation of the "Opus" parasites to make it worth while investigating for parasitized larvae. I think, however, that it now would be interesting to secure small quantities of coffee berries from some of the trees in the immediate neighborhood of where these special parasites were liberated and to work these out for possible parasites in the insectary. During my visit in Kona I arranged a meeting with Mr. Macfarlane of the Capt. Cook Coffee Company and concluded an arrangement with him whereby he would be willing to defray his portion of the expense incurred by reason of our having previously bargained with Japanese and other planters to each set aside a  $\frac{1}{4}$  acre (approximately) of bearing coffee trees wherever the "Opus" parasites had been liberated. Messrs. Hackfeld & Company having already practically agreed to the same course, provided Mr. Macfarlane also concurred, the Board has been saved considerable funds which would otherwise have had to be expended to reimburse the Japanese and others for the crops on the  $\frac{1}{4}$  acres referred to. There were five or six of these areas reserved from the present crop pickings, the reservation being allowed for a period of approximately three months.

W. M. GIFFARD.

Honolulu, Sept. 1, 1913.

DISTRIBUTION OF HORN FLY PARASITES BY W. M. GIFFARD IN HILO, PUNA, KAU AND KONA BETWEEN AUGUST 9 AND 15, 1913.

Six vials containing approximately 600 horn fly parasites taken on Mauna Kea August 9, 1913, and distributed as follows:

August 10—Keanu Ranch, Puna, W. H. Shipman, owner. Two vials 200 parasites liberated in cow pen at lower end of ranch. Conditions as to future liberations could be improved by gathering and placing manure in special enclosure. Present conditions not altogether satisfactory because of cattle tramping down the droppings in the pen.

August 10—Kapapala Ranch, Kau. (One vial, 100 parasites, to Julian Monsarrat. To prevent delay in transporting the other parasites further into the Kau district I had no opportunity to break my journey and inspect the conditions for liberation on this ranch which is located off the government road. I explained

to Mr. Monsarrat in person what was most desired as to condition of cow droppings, and he promised to get to work on these at once.

August 11—Hawaiian Agricultural Co., Pahala, Kau; W. H. Ogg, manager. One vial, 100 parasites. Upon inspection conditions were not found altogether satisfactory in the enclosure selected by Mr. Ogg for liberation of the parasites. I therefore withheld a portion of the parasites intended for that place and distributed them elsewhere. The enclosure is at the corner of a large pasture which cattle frequent daily,  $\frac{1}{4}$  mile east of the mill near Chinese graveyard. I found much manure piled in the enclosure but as yet no pupae. Suggested that in future manure be spread only 6 inches deep in enclosure and that intervals of a few days take place between each spreading. Mr. Ogg is much interested in the establishment of the parasite and is taking particular pains to arrange conditions properly for future liberations. I would suggest that, at as early a date as possible after due notice from him, we send him a strong colony. I fear that those I liberated there will not multiply satisfactorily as pupae was scarce at the time. The same may be said of the previous lot sent him via Hilo and the Volcano House. These were placed in an open pasture where droppings were more or less tramped down by cattle.

August 11—Hutchinson Sugar Plantation Co., Naalehu; Geo. Gibb, manager. Two vials, 200 parasites. Practically the same conditions applied here as at Pahala. The droppings were unsatisfactory and but few pupae seen. The manager has selected an enclosure in the bullock pen about 1000 feet away from the road leading to manager's house. Water is in close proximity and the adjoining pasture is fairly stocked with cattle. As the manager promised to have gathered a larger quantity of suitable manure and placed in the enclosure I agreed, if possible, to liberate parasites there again upon my return trip from Kona.

August 13—Received 15 vials, approximately 1500 parasites, at Kealahakua via Kailua per Mauna Loa.

August 13—W. H. Greenwell Ranch, Kona. Three vials, 300 parasites, were sent by me through one of the Greenwell boys to the Puulehua section of the ranch, ten miles inauka from Kealahakua, at 4200 feet elevation. Conditions were said to be good up there as to manure because of the dairy, 100 cows being milked daily. Besides this the regular range of the ranch is in that section. Upon inspection of the home dairy at the homestead on the government Kona road I found conditions for liberating altogether unsatisfactory and, as horn fly at the time was not bad anyway in the latter place, I decided to have the parasites liberated in the Puulehua section above referred to.

August 13—John Paris Ranch, Kona. Three vials, 300 parasites, were given by me to Mr. Paris for him to take personally

to the mauka cattle range where they were not only most needed but where horn fly was more of a pest than at the homestead at Kealakekua. The section referred to is at a high elevation at Hoomaunau, and full instructions as to conditions and liberation were personally explained to Mr. Paris. His small cow pasture at Kealakekua was not at this time satisfactory for liberation of parasites there.

August 13—John Maguire Ranch, Puuhi, Kona. Three vials, 300 parasites, delivered to manager for liberation. Report as to location has since been received by the office.

August 13—R. R. Hind's Ranch, Puuwaawaa, Kona. Three vials, 300 parasites, delivered to manager for liberation. Same written and verbal instructions given to the Hind's and Maguire's ranches as in the other cases.

*Note*—A very heavy rain storm which occurred all the day of the 13th prevented my riding over any of the ranges to inspect present conditions as to pupae of the fly. It would be well to send all the Kona as well as the other Hawaii ranch managers copies of the new directions for preparing manure enclosures before parasites can be liberated. Upon due notice being received that the manure pile will have more or less pupae by a certain date efforts should be made, if possible, to send parasites to them in care of purser after wirelesslying the managers that this is being done.

August 14—Upon return to Kau district liberated as follows: Three vials, 300 parasites, more or less (some of these vials contained a less number of parasites than others received). These were liberated under better conditions in the Hutchinson enclosure at Naalehu previously referred to.

*Note*—I delivered on August 10 to Brother Matthias at Hilo the following parasites brought up with me on the Mauna Kea, viz: 200 Chalcids for Hamakua district, 100 horn fly parasites for Kukaiau, 100 horn fly parasites for Hilo. Reports as to the liberation of these will come directly from Brother Matthias.

W. M. GIFFARD.

Honolulu, Sept. 1, 1913.

Austria not only sells timber, but timber products from its forest lands, and disposes of about 3,500,000 railway ties a year. There is no provision in the United States by which the national forests can dispose of manufactured lumber, though the policy of selling standing timber is well established.

The Canadian government has supplied twenty-five million tree seedlings to farmers, principally in the Alberta and Regina plains region. The United States does not supply young trees to the public, except in a limited area in Nebraska, under the terms of the Kinkaid Act.

## DIVISION OF ANIMAL INDUSTRY.

Honolulu, July 31, 1913.

Hon. W. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry.

Sir:—I beg to report on the work of the Division of Animal Industry for the month of July as follows:

*Hog Cholera.*

The suggestion contained in my report for last month in regard to the origin of the recent epidemic of virulent hog cholera on the Island of Oahu, and to the effect that the outbreak is due to a recrudescence of the mild chronic form of the disease which has been known here for years, seems to be confirmed by the fact that no complaint has reached this office of imported hogs being sick or developing the disease after arrival here, nor has it been possible to trace the disease to any of the recent importations of hogs, which have, besides, been few and far between.

The Board's decision to promulgate a regulation to prevent the spread of the disease to the other islands took form with the approval by the Governor of Rule and Regulation No. VII of the Division of Animal Industry on July 10, 1913.

Although no hogs have been shipped from Oahu since that time the disease has nevertheless made its appearance on Kauai in the Koloa district, from where the deputy Territorial veterinarian reports the death of a number of hogs including most of those belonging to the Koloa Sugar Company. He suggests that the disease was brought there with a couple of hogs shipped from Honolulu several weeks ago, but inquiry made at the freight office of the Inter-Island Steam Navigation Company shows that no hogs were shipped to Kauai since the month of May when six pigs were sent from the Waialae Ranch to Mr. Walter McBryde, from either of which places no disease has been reported. It would therefore seem likely that the outbreak on Kauai might be of the same nature as that on Oahu, that is a recrudescence or reinforcement of the attenuated virus, the continued presence of which cannot be doubted, even though the mild form the disease had attained made it fatal only to young pigs whose natural resistance had been impaired or weakened by other diseases or unfavorable surroundings and conditions, all tending to obscure the true nature of the disease. Rule IV of this Division, pertaining to the importation of hogs from the mainland of the United States, has proved effective in keeping out hog cholera ever since it went into effect several years ago, previous to which time the arrival of cholera hogs was of frequent occurrence; and so long

as the rule is enforced conscientiously there is little or no danger of fresh infection gaining an entrance here. It therefore remains to control the present outbreak with the means at hand, that is, segregation, disinfection and preventive or curative injections of hog cholera serum along the lines recommended by the Federal Bureau of Animal Industry.

A request from the deputy Territorial veterinarian of Kauai for the appointment of four quarantine guards by this Board for the purpose of preventing the spread of the disease beyond the Koloa district was referred to the committee on animal industry, which, at a meeting held on July 22nd, directed me to instruct him to deal with the outbreak along the lines indicated above, and calling his attention to the requirement of the regulations of this Board to the effect that all expenses in connection with the control and suppression of local outbreaks of infectious and contagious diseases must be borne by the owner, at least so far as the segregation, disinfection, destruction and disposal of diseased or dead animals are concerned, and that, if it is considered necessary to appoint guards, the same must be provided by the local health authorities or by the owners requiring them. The revised statutes of the Territory as supplemented by the regulations of the Board provide the necessary authority for effectively dealing with outbreaks of animal diseases, and the violation of an order to quarantine or segregate diseased animals carries with it consequences sufficiently severe to obviate the necessity of special quarantine guards so long as the outbreak is under the immediate supervision of an officer of this Board. It should, however, be borne in mind that this is the first time that the deputy on Kauai has had occasion to deal with an acute infectious disease of an epidemic nature, and that undoubtedly he was not aware of the authority vested in him when making the above mentioned request. So far as is known the disease has not made its appearance on any of the other islands to this date, and with the preventive measures taken for its suppression there is every reason to expect that further losses will be limited to scattered individual cases, or to herds where no effort is being made to protect the animals against it.

#### *Control of Bovine Tuberculosis.*

This work has been entirely in the hands of the assistant Territorial veterinarian in whose report the details of the same will be found. The testing of the dairy herds in the city of Honolulu, which has now been finished, while showing a comparatively small decrease in the number of affected animals, as compared to that recorded in the earlier tests, has nevertheless shown results which fully demonstrate the value of the work as well as the reliability of the methods employed. The complete eradication of the disease cannot be looked for until the more frequent

testing (four to six times annually) of the remaining infected herds is resorted to. The herds which were found clean the last two times they were tested will undoubtedly remain clean if care is taken to prevent their reinfection by the introduction of new animals, unless these come from other clean herds or else are kept segregated until they have passed two tests with an interval of four months. All herds, however, in which diseased animals (reactors) were found at this last test should now be retested every three or four months until they have passed three successive tests. As 60.4 per cent. of the dairy herds in the city have been found clean for the past two years there still remain 39.6 per cent. to be submitted to the frequent test method. As it must be obvious to every dairy owner that the sooner the disease is detected in an animal the less opportunity it will have to transmit the infection to the other animals in the same stable, it is not expected that any objection will be raised by the owners, especially as the present method causes little or no inconvenience to either owner or animals. The experience of other communities, notably the District of Columbia, has fully demonstrated that the disease cannot be completely eradicated if the annual test is adhered to, as it gives an infected animal, which has not yet had time to develop the disease sufficiently to react to the test, the better part of a year in which to become dangerous and a varying number of months during which it may excrete the virus before apprehended by the next test. It is therefore recommended that as soon as the testing of the herds in the county of Oahu, outside of Honolulu, has been finished, a retest be begun of those herds which were not found clean at the last test, to be followed by those which were not found clean at the last two tests.

#### *Honolulu Quarantine Station.*

I regret to have to report that on the night of July 15 (Sunday) a dog was stolen from the station. This animal, a cross between a Spitz and a Japanese spaniel, of no intrinsic value whatever, had arrived from San Francisco a couple of weeks previously and was expected to return to that place about the end of July. In fact the health certificate required by the California authorities had already been made out when, on the morning of the 16th, the keeper found the kennel empty though locked (bolted), the same as when he last attended the dog Sunday night. There was also plain evidence of a person having climbed over the woven wire fence to get in and of raising the same from the ground to pass the dog out under it. Further investigation showed that an automobile had come to the station on the Ala Moana road during the night, making a sharp turn outside the gate of the alley leading to the dog division and returning the way it came. The matter was immediately laid before the attorney general at whose request the local police authori-



ties undertook an investigation which, however, had led to no definite result at the time I left Honolulu for Hawaii. At the time of the theft there were a number of valuable dogs in the station, none of which were tampered with, demonstrating plainly that the removal of this particular dog, which could be of no value to anybody that did not know it, or were fond of it, must have been perpetrated by either the owner or somebody actuated to serve or harass the owner.

In the meantime steps have been taken to reinforce the fences, but it is obvious that the station, and especially the dog division, cannot be made burglar proof except at great expense, and then only by excluding the cooling breezes which are essential for the welfare, not to say the life, of the animals during their prolonged detention. Until the police department has reached some definite conclusion or located the missing dog it would seem advisable not to discuss the matter publicly, but I sincerely hope that the guilty person can be brought to justice and a precedent established that will be a warning to others who may feel inclined to disregard the quarantine regulations of the Board at any cost.

#### *Trip to Hawaii.*

Pursuant to verbal instructions from the President of the Board I left Honolulu on July 26 for the purpose of making a final examination of the horse stock in Waipio Valley and incidentally inspecting the new quarantine stations at Hilo and Kahului. I am pleased to report that the new Hilo quarantine station is well built and satisfactory in every essential respect. There is, however, much work to be done by the caretaker in road building and leveling, besides the filling in and flooring of the shelter sheds. Most of the material for this purpose is, however, on the ground and Dr. Elliot believes he has obtained a good steady man to do the work. I am further pleased to report that I have so far failed to find any indication of even a trace of the glanders infection remaining in Waipio valley. I have not alone examined all of Akaka's work animals, but have made diligent inquiries from many persons in the neighborhood, all of whom agree that there is no more disease among the horse stock in the valley, but that Akaka's animals are in better condition and better taken care of than has been the case for years. His stables are also in good condition. I leave for Maui tomorrow, where, with the Board's permission, I should like to remain a few days with Dr. Fitzgerald. If necessary that I should return at once a message addressed in his care will reach me without fail. I have, however, benefited so much already by this trip that I hope that I can be spared for a few days more.

Very respectfully,

VICTOR A. NORGARD,  
Territorial Veterinarian.

## REPORT OF ASSISTANT.

Honolulu, July 31, 1913.

Dr. V. A. Norgaard, Chief of Division of Animal Industry,  
Bureau of Agriculture and Forestry.

Sir:—I have the honor to submit herewith my report for the month of July.

*Tuberculosis Control.*

During the past month 953 head of cattle have been tested, of which number 915 have passed and 38 been condemned and branded. The following is a tabulated list of the different dairies visited with the number of cattle tested, condemned or passed in each:

	T.	P.	C.
June 30-July 5—Chas. Bellina.....	230	208	22
June 30-July 5—M. M. Pedro.....	14	14	0
July 2-5—Frank Andrade .....	94	94	0
July 7-10—S. M. Damon.....	148	145	3
July 7-10—Frank Correa .....	13	13	0
July 7-10—W. P. Louis.....	14	14	0
July 7-10—Kamehameha Schools .....	40	39	1
July 8-11—S. M. Damon.....	195	192	3
July 9-12—M. Kawamura .....	5	5	0
July 9-12—M. Quintal .....	5	5	0
July 9-12—Joe Fernandez .....	8	8	0
July 9-12—S. Teunoto .....	10	10	0
July 8-12—G. L. P. Robinson.....	6	6	0
July 9-12—Frank Vaeph .....	5	5	0
July 14-17—M. Riedell .....	8	8	0
July 14-17—Desidero Fello .....	2	2	0
July 14-17—J. P. Mendonca.....	14	14	0
July 14-17—Alexander Young .....	59	55	4
July 14-17—C. J. Day.....	3	3	0
July 14-17—Geo. Holt .....	38	34	4
July 14-17—Geo. Wond .....	33	33	0
July 15-18—Y. Nakamura .....	4	4	0
July 15-18—S. Boyama .....	9	9	0
July 15-18—I. Morioko .....	16	15	1

Attention is drawn especially to the four cows condemned on this test in the Alexander Young dairy. On the first general test of dairy stock in the city and county of Honolulu four years ago, this herd was given the subcutaneous test by Dr. W. T. Monsarrat, who condemned 26 head out of a total of 37 animals submitted to the test. Subsequent post mortem examinations of the condemned ones showed them to be extensively affected with

tuberculosis, many of them being condemned entire as unfit for food.

Considering the large amount of tuberculosis present in the herd the remaining eleven animals were naturally regarded with suspicion, as there was little chance of their escaping the infection and one or two reactions were expected during the next two or three years, the time depending of course on the progress of the disease in the animal system. The second and third tests passed without showing any reactions among these eleven cows, which is surprising when it was almost certain that some of them were infected. Owing to the excellent care and treatment which these animals received their vitality was of such a high degree that they were able to hold the disease in check. On this, the fourth test, however, two of these cows gave unmistakable reactions along with an imported cow and a heifer which had been raised in the place. Careful post mortem examinations were performed on all these animals, the results of which are as follows:

No. 1.—3-year-old heifer raised on the place from imported California stock. Reaction: Large and typical in character. Lesions: Small, recent nodules in the retro-pharyngeal and broncho-oesophageal lymph glands.

No. 2.—Imported short horn cow; had passed subcutaneous test on the coast and one intradermal test here a year ago. Reaction: Small in size but showing all the typical characteristics. Lesions: Small nodules in portal lymph glands and large abscesses the size of the closed hand in the liver. The carcass was in prime condition.

No. 3.—Grade Hereford cow. Had been in the dairy for some years and had passed three tuberculin tests, the first of which was the classical subcutaneous method. Reaction: Medium size and of a typical character. Lesions: A careful examination failed to reveal any tuberculous lesions in the usual seats of the disease. Although I made a most careful examination in this case and was unable to find any evidence of disease it is more probable that I overlooked it than that it was not there. This is the first case out of thirty-five post mortems in which I have failed to locate the disease.

No. 4.—Grade Holstein cow. Like the above animal it had been in the dairy for a number of years and had passed through the same three tests. Reaction: Large and of a diffuse character, the injected fold being at least four times as thick as the opposite one. Reactions of this character although positive indication of the presence of tuberculosis, are comparatively rare. Lesions: Left retro-pharyngeal lymph gland contained six well encapsulated nodules all nearly alike in size being nearly the diameter of a dime. The connective capsule around each was very prominent and completely circumscribed it. These gave every evidence of being in a quiescent stage and had they been the only

lesion in the animal system the cow would in all probability have shown no reaction. The diaphragmatic lobe of the right lung contained a mass of tuberculous tissue six to eight inches in diameter, containing a cheesy semi-calcified material in the center; this was surrounded by numerous nodules varying in size from a dime to half a dollar, all of which indicated renewed activity of the disease at this point.

There is still one cow in the dairy, also one of the eleven remaining from the first test, which, although it showed no reaction, not even the slightest swelling at the point of inoculation, presented to palpation a greatly enlarged retro-pharyngeal lymph gland which is undoubtedly of a tuberculous nature, but which is so completely sequestered as to be beyond detection by any tuberculin test. Such an animal while not an immediate danger is an unsafe proposition, and the owner was advised to dispose of it at the earliest moment.

In connection with the testing of dairy stock and the improvement of the sanitary conditions under which milk is being produced, I bring attention to a clause in Section 11 of the city and county milk ordinance which provides for the issuing to each dairy owner upon application a permit to sell or otherwise dispose of milk. The clause above referred to reads as follows:

"He shall within four months after the filing of such application furnish a certificate from a veterinary surgeon showing that all such cows are free from tuberculosis. The Board of Supervisors shall provide for the testing of cows and the furnishing of such certificate without charge to the applicant."

In order to aid the Board of Supervisors to intelligently carry out the provisions of Section 11 of the milk ordinance and to enable them to revoke any and all permits where the applicants have not within the required period of four months furnished the above referred to certificate of health from a veterinary surgeon, it is hereby recommended that the Board of Agriculture and Forestry through its Division of Animal Industry issue direct to the Board of Supervisors such a certificate of health upon the completion of the tuberculin test in each dairy. The following blank form of certificate is recommended:

### CERTIFICATE OF HEALTH.

Name . . . . .  
 Location of dairy . . . . .  
 Number of cows tested . . . . .  
 Number of cows passed . . . . .  
 Number of cows condemned . . . . .  
 Disposition of reactors . . . . .

Remarks on hygienic conditions.....

Date.....

.....  
Territorial Veterinarian.

The above form is concise and gives all the information required from the Division of Animal Industry in the issuing of a permit to sell milk. Detailed information on the hygienic methods in use in individual dairies should be obtainable from the files of the city and county milk inspector. The addition to the herd of untested cows should appear in the daily report of the milk inspector and the Territorial veterinarian at once notified of the presence of such animals so that they can be tested.

Importations at the port of Honolulu for the month of July:

July 1—S. S. Lurline, San Francisco: G. T. Weinberg, 13 horses, 2 mules; Various, 22 crates poultry; U. S. Lep. Exp. Station, 5 crates hares, 2 crates monkeys; W. F. Pogue, 4 crates poultry; Maui Agricultural Co., 2 crates poultry.

July 2—S. S. Mongolia, Orient: Benj. Megic, 2 Japanese spaniels.

July 7—S. S. Ventura, San Francisco: Various, 5 crates poultry.

July 8—S. S. Wilhelmina, San Francisco: Mrs. M. Howe, 1 dog; Hind, Rolph Co., 1 crate pigeons; Various, 21 crates poultry.

July 15—S. S. Honolulan, San Francisco: Schumann Carriage Co., 26 mules; Capt. W. C. Short, 2 horses, 2 dogs; Various, 16 crates poultry.

July 21—S. S. Sierra, San Francisco: Mr. Church, 1 Boston bull dog; Various, 21 crates poultry.

July 29—S. S. Lurline, San Francisco: Alexander & Baldwin, 43 mules; J. R. Banning, 4 horses; Quartermaster Department, 4 horses; Various, 19 crates poultry.

Respectfully submitted,

L. N. CASE,  
Assistant Territorial Veterinarian.

REPORT FOR AUGUST.

Honolulu, Sept. 3, 1913.

Hon. W. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry.

Sir:—I beg to report on the work of the Division of Animal Industry for the month of August, 1913, as follows:

*Worm Disease on Maui.*

On my return from Waipio valley, Hawaii, I stopped on Maui to inspect the new animal quarantine station at Kahului and to get a first hand idea about live stock conditions on that island with special reference to bovine tuberculosis. That my visit proved timely will be seen from the following: In a certain district (around Spreckelsville) a considerable number of mules have recently died, nearly all showing symptoms more or less identical with those generally accepted as characteristic of cerebro-spinal meningitis. In one large plantation stable alone nearly thirty head have died in the course of eight to nine weeks, the course of the disease lasting from less than one hour to several days, but rarely exceeding one week, except in the few cases where recovery ensues. The animals may become affected either while in the stable or while at work in the field. In the latter case there is but slight hope of recovery, the principal symptoms being extreme difficulty of respiration, the animal seeming to suffocate, with staring eyes, open mouth and more or less profuse hemorrhage from the nostrils. These attacks appear principally on sultry days, the animal breaking out in profuse perspiration, sometimes showing considerable bloating of the abdomen, and soon falling down in the harness and dying in extreme agony. When taken in the stable the symptoms are less severe and more like those of mouldy feed poisoning or spinal meningitis.

At the urgent request of Dr. Fitzgerald, who was at his wits' end, his losses on one plantation aggregating more in two months than in the preceding two years, I stayed with him in hopes of seeing one or more fresh cases and especially in hopes of examining one or more after death. In the meantime every condition pertaining to live stock sanitation and hygiene was carefully gone into, and while several milder cases were seen it was not until I was ready to return to Honolulu that a typical fatal case occurred. The day was extremely hot and sultry and the animal in question was hitched to a cultivator when the driver noticed that it had broken out in profuse sweat. Before long it stopped short, the head stretched out straight with eyes popping out and the mouth wide open, and in a few minutes fell to the ground with blood running from both nostrils and death resulting in short order. An hour later when I reached the place the carcass was considerably swollen, the luna in charge being of the opinion that at least some of the swelling was present before the mule died.

A careful postmortem examination showed extreme infestation of the large body arterics with the armed wire worm or palisade worm (*strongylus armatus*), some of the aneurisms on the posterior aorta being the size of a hen's egg and filled with a more or less organized blood clot from which protruded the

wriggling bodies of the worms. These were also seen half buried in the inner lining of the adjoining blood vessels, producing conditions strongly resembling the mucous membrane of an intestine affected with typhoid ulcerations. As none of the intestines were swollen or discolored from embolism there can be little doubt that the violent symptoms and sudden death must be due to lesions anteriorly to the diaphragm. The lungs were distended with blood and of dark purple color, confirming the diagnosis of suffocation, but an actual rupture of pulmonary blood vessels could not be found though the larger bronchi and the trachea were filled with frothy blood. This again would indicate that the actual site of the cause must be sought in the brain and undoubtedly in the form of paralysis of the respiratory center, resulting from either chemical substances, toxins, or, considering the already described conditions of the abdominal arteries, as the result of embolism, that is, the wedging of a minute blood clot, torn by the blood stream from the large clots in the abdominal vessels and carried with the circulation to the brain, where according to the location, pressure by the obstructed blood stream behind the embolus, various symptoms will be produced, as for instance, paralysis of the respiratory center. As there are 18 ways—nine on either side—by which such a clot (embolus) may enter the brain it is easily understood that it may become lodged or wedged in almost any part of the brain, and that consequently the resulting symptoms may manifest themselves in any part or organ of the body, exactly as is observed in this mysterious disease, generally called cerebro-spinal meningitis. Sometimes the entire hind part is paralyzed, sometimes only the throat, or the tongue, or the muscles of deglutition (swallowing), or the optic nerve (blind staggers) or as already stated—the center of respiration is affected, and the animal suffocates as effectively as had it been strangled.

I have to state that this theory—that spinal meningitis may be due to nothing but eggs, embryos or the blood clots produced by this same wire worm, circulating in the blood until arrested in the brain—is not original with me, but has been recently advanced by one of the scientists, who studied this disease on the spot when more than 30,000 head died in the course of two months in Kansas and Nebraska a year and a half ago. It is, however, only my observations on Maui, and especially the post-mortem examination above referred to, that has convinced me of the plausibility of the theory, especially as it opens up a possibility of combating this most mysterious of all equine scourges, and the one which at the present time is causing greater loss in these Islands than all others combined. But unfortunately the life history of the worm in question has not been fully worked out, even though we know that in all probability the drinking water is the principal carrier and distributor of the parasite. As the Board

will know from my previous reports I have long been of this opinion, and have before observed gratifying results when it was possible to filter the drinking water or at least exclude from consumption streams, pools and ditches known to carry the infection. I have therefore gone to work on this theory and am endeavoring to solve the question of providing filtered or at least uncontaminated drinking water for the work animals not alone when at home in their respective stables but also while at work in the fields. This requires the filtering of large quantities of water, which often carries a great deal of suspended soil, and besides, the transportation or piping of such purified water to frequently distant fields in sufficient quantities to provide from 3 to 5 gallons for each animal when fed at noon. Whether the artesian water obtainable in many places is free from the infection has to be determined, and the constant reinfection of rest pastures (Sunday pastures), and streams leading to or through them must be controlled. The destruction of the parasites within the animal organism, medicinally, is at present despaired of, but may be accomplished by antitoxin or serum treatment since it has already been demonstrated that the injurious effect of some intestinal parasites—tape worms for instance—is due to poisonous products excreted by them, and not to mechanical or nutritive injuries. And finally the eradication of the parasite from the Territory must be attempted along the same lines as with other diseases, first and principally by limiting the supply constantly brought in with imported animals, from without. I have, in company with Dr. Elliot, made postmortem examination of a mule that died in quarantine a few days after arrival and which was fully as badly infested with the armed wire worm as any I have seen here.

In conclusion, if this surmise in regard to the identity of cerebro-spinal meningitis, feed and mould poisoning and the equally fatal colic is substantiated, and the theory is supported by some of the leading worm scientists of the country then there is every reason for an unrelenting campaign against the parasite in question, and I trust to be able to report progress along the lines indicated in my future reports.

#### *Kahului Quarantine Station.*

Though of small size as compared to the Honolulu and Hilo stations I feel sure that any single importation to Maui can be accommodated within it. The arrangement of paddocks, stalls and chutes is almost ideal, and when a number of the trees which now stand in the paddocks have been removed it will be difficult for any importer to find anything to criticize. The water supply is abundant and convenient, and an isolation paddock for suspicious cases of infectious diseases fills a long felt want.

Dr. Fitzgerald has already done a considerable amount of test-



ing for bovine tuberculosis, and all reactors have been destroyed under his supervision. This work will be pushed by him so far as he is able to do it without financial aid from either Territory or county, but in a conference with some of the members of the Maui Board of Supervisors I was given to understand that the question of promulgating a milk ordinance has not been dropped but will receive attention in the near future.

### *Rabies and Dog Quarantine.*

The daily papers from the mainland as well as veterinary and other scientific periodicals continue to report outbreaks of rabies in increasing numbers, while the Pasteur institutes for the treatment of bitten persons testify to the numbers that constantly present themselves for preventive injections. Even the veterinary profession has begun the treatment of pets or valuable dogs which have been bitten or exposed to the infection where mad dogs are known to have been abroad.

In this connection I have to report that the dog which so mysteriously disappeared from the quarantine station on July 13 has been returned by the owner who claims that he accidentally found it in a house on King street, where it is said to have been ever since it disappeared. The dog is fortunately sound so far as can be seen. The question of further action in the matter is respectfully submitted for the Board's decision.

In the meantime the dog division has been reinforced so far as possible, the inside fence with three strands of barb wire, while a kiawe hedge will be planted along the outside fence, and the paddocks provided with padlocks and chains. The only further precaution which could be taken would be to have a keeper sleep within the enclosure, which, if decided upon, will require the building of a cottage for his use.

### *Tuberculosis Control Work.*

This work has been reported on in the appended report by Dr. Case and should be considered in connection with my remarks on the subject in last month's report. I have under consideration a change in the present regulations, requiring that all dairy stock intended for importation to the Territory must come from herds known to be free from tuberculosis. Some very valuable cattle have been imported here, passing the test successfully both before and after arrival, only to be found reacting when tested again, six months to a year after arrival, showing that they must have been infected at the time they were tested for shipment, but not sufficiently to cause a reaction. In every case these animals came from infected herds, and in one case at least there is no possibility of infection having taken place after arrival here, the owner having had a clean herd for the past three or four

years. I am now corresponding with the live stock sanitary authorities in various States on the Coast to see what can be done to protect the local importers, and will report further on the subject. In the meantime it will be seen that bovine tuberculosis is steadily though slowly on the decrease, but it is hoped that no objections to the plan suggested in my last report will be met with on the part of the owners and that we may before very long be entirely rid of the disease in the city and county of Honolulu.

Very respectfully,

VICTOR A. NORGAARD,  
Territorial Veterinarian.

#### REPORT OF ASSISTANT.

Honolulu, Sept. 5, 1913.

Dr. V. A. Nørgaard, Chief of Division of Animal Industry.

Sir:—I have the honor to submit the following report for the month of August, 1913:

#### *Tuberculosis Control.*

The animals in the following dairies have received the tuberculin test:

	T.	P.	C.
August 8-11—The Rose Davison Dairy....	4	4	0
August 16-19—Vincent Bowen .....	3	3	0
August 18-21—P. M. Pond, Mokuleia.....	105	101	4
August 19-22—R. Compos .....	4	2	2
August 19-22—Lunalilo Home .....	15	15	0

The above practically finishes testing the city dairies. The total number of animals so far tested in these dairies is 2103, of which number 88 have been condemned, or 4.18 per cent. There still remains to be tested the range herds on the different ranches from which many dairies are supplied with milk cows, and which will amount to about four thousand head. This work cannot be undertaken until the annual drive has been finished, the lack of feed having compelled several ranch managers to postpone the segregation and branding as well as the testing, until conditions are more favorable.

#### *Importations.*

The following livestock arrived here during the past month:

August 4—S. S. Sonoma, from San Francisco: 2 dogs, 1 box rabbits, 1 crate poultry, R. H. Campbell; 10 crates poultry, N. B. Lansing.

August 5—S. S. Wilhelmina, from San Francisco: 1 dog, W. O. Pearce; 1 crate poultry, W. F. Exp. Company; 1 crate poultry, H. May & Co.; 9 crates poultry, N. B. Lansing; 1 crate poultry, Schuman Carriage Co.

August 7—S. S. Hilonian, from Seattle: 1 dog, R. H. Campbell; 67 mules, 15 horses, Quartermaster's Dept., U. S. A.

August 12—S. S. Honolulan, from San Francisco: 17 mules, Club Stables; 23 mules, Schuman Carriage Co.; 1 dog, Mrs. P. H. McKaigae; 1 crate poultry, E. O. Hall & Son; 1 crate poultry, F. L. Hoogs; 18 crates poultry, 1 crate ducks, N. B. Lansing; 2 crates poultry, Mrs. S. B. McKenzie, Hilo; 57 head cattle, Hind, Rolph & Co.

The distribution of the above 57 head of cattle was as follows: H. M. von Holt, 6 short horn bulls, 6 Hereford bulls; Kamehameha Schools, 5 Holstein heifers; Umikoa Ranch, 4 Hereford bulls, 1 Holstein bull; W. H. Shipman, Hawaii, 8 Hereford bulls, 2 Angus bulls, 1 Holstein bull, 2 Holstein heifers; A. W. Carter, 1 Holstein heifer; Puuwaawaa Ranch, 2 Angus bulls, 6 Hereford bulls, 1 Holstein bull, 4 Holstein heifers; Mrs. E. C. Greenwell, 1 Angus bull, 2 Hereford bulls, 1 Holstein bull; J. A. Maguire, 1 Holstein bull.

August 18—S. S. Sierra, from San Francisco: 4 crates poultry, August Carrier; 6 crates poultry, A. Lambert; 6 crates poultry, J. Sly; 8 crates poultry, Sing & Sing Company; 2 crates poultry, M. Vasconcellas; 24 crates poultry, N. B. Lansing.

August 26—S. S. Lurline, from San Francisco: 3 horses, 16 mules, Club Stables; 1 mare, 1 colt, A. W. Carter; 1 crate poultry, E. L. Marshall; 3 crates poultry, J. Doyle; 6 crates poultry, A. Lambert; 9 crates poultry, N. B. Lansing; 1 dog, W. F. Ex. Co. (E. Field, Wahiawa); 1 parrot, Ivan Johnson; 1 horse, M. Vasconcellas (crippled).

The above horse was suffering from fracture and dislocation of the pelvis when shipped from San Francisco. This condition was due to an accident received some time before shipment. The voyage to Honolulu no doubt greatly aggravated the injuries and the animal was in such shape when landed here that the consignee refused to accept delivery of it. The horse is now at the quarantine station pending negotiations between carrier and shipper.

Respectfully submitted,

LEONARD N. CASE,  
Assistant Territorial Veterinarian.

A toy company at Sheboygan, Wis., started out to use only the waste wood from other mills. It has worked out a system of using all small waste pieces so that practically nothing but the sawdust is lost.

## DIVISION OF ENTOMOLOGY.

Honolulu, July 31, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of July as follows:

During the month 43 vessels arrived at the port of Honolulu, of which 22 carried vegetable matter and one vessel moulding sand.

<i>Disposal</i>	<i>Lots</i>	<i>Parcels</i>
Passed as free from pests.....	1025	18,392
Fumigated . . . . .	17	575
Burned . . . . .	43	135
Returned . . . . .	2	61
Total inspected . . . . .	1087	19,163

Of these shipments 18,975 packages arrived as freight, 124 packages in the baggage of passengers and 64 packages in the mail.

*Rice.*

During the month 27,280 bags of rice arrived from Japan and 2600 bags were found infested with live weevils, and the larvae of the rice moth (*Paralipsa modesta*). Arrangements were immediately made with the consignees to fumigate the whole shipment and as we are without adequate large room for such work we used our small room capable of holding 200 bags and used our large double oiled tarpaulin which covered 125 bags. A double dose of hydrocyanic acid gas was used with good results and the rice was immediately taken to the mill for cleaning. All the bags were marked fumigated at Kobe and the owners, Alexander & Baldwin, had certificates stating that the rice had been fumigated at Kobe. Nevertheless the whole shipment was infested and this condition can be explained thus: Either not all of the rice was fumigated and the infested bags reinfested the rest of the shipment, or the rice was loaded on top of some infested rice shipment going to San Francisco and became infested through it. I have written to the California State commissioner of horticulture asking him to take some action in regard to rice shipments and called his attention to the various pests found on rice shipments. Meanwhile we are getting matters well planned to erect a large fumigatory near the waterfront just for such emergencies as we had this month.

*Pests Intercepted.*

Fifteen packages of fruit and 25 packages of vegetables were found in the baggage of passengers and immigrants from the Orient. These were all seized and destroyed by burning.

One hundred and two boxes of apples and 6 boxes of pears came from the Coast, which were badly infested with the codlin moth. Of these 62 boxes of apples and 6 boxes of pears were put back on the Ventura going to Sydney with the request that they be dumped at sea, and 60 boxes were returned to the Coast on the Lurline, which left the same day that fruit arrived. I notified the shipper regarding these shipments and sent him copies of our rules and regulations relating thereto.

The U. S. Experiment Station received a box of Manila hemp roots (*Musa textil*) which were found badly infested by a borer closely allied to the cane and banana borer. The shipment was destroyed by burning. The same package also contained a nest of ants (*Prenolepis bourbonica*).

In the mail was found a package of seed corn infested with the Angoumois grainmoth (*Sitotroga cerealella*). The package was fumigated before delivery. Two packages of beneficial insects arrived for the H. S. P. Association and were opened in my presence. One lot contained besides ophis parasites a quantity of larvae and eggmasses of an Asilid fly, a special report on which I submitted to the Board during this month.

*Queenbees.*

Two queenbees arrived in the mails and after examination, having a satisfactory certificate, they were allowed to be delivered.

*Hilo Inspection.*

Brother M. Newell reports the arrival of seven steamers and one sailing vessel, of which six steamers carried vegetable matter consisting of 119 lots and 2082 parcels, all of which was found free from pests and was passed. During the month the Anyo Maru visited Hilo direct from Japan and Mr. D. B. Kuhns was delegated to be on hand at Hilo during the unloading of said vessel and to go over the cargo with Brother Newell. There were 6100 sacks of rice and 605 bags of beans landed at Hilo, all of which was found free from pests and was passed. One shipment of plants was on board but was not allowed to land on account of Federal as well as Territorial regulations.

*Inter-Island Inspection.*

During the month of July 69 steamers were attended to and the following shipments were passed:

Plants . . . . .	807 packages
Taro . . . . .	684 bags
Fruit . . . . .	7 packages
Lily root . . . . .	9 packages

Total passed . . . . . 1507 packages

The following packages were refused shipment:

Fruit . . . . .	10 packages
Plants . . . . .	11 packages

Total . . . . . 21 packages

These were refused shipment on account of infestation and soil attached.

Respectfully submitted,

E. M. EHRHORN,  
Superintendent of Entomology.

#### REPORT FOR AUGUST.

Honolulu, August 30, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of August as follows:

During the month 40 vessels arrived at the port of Honolulu, of which 23 carried vegetable matter and one vessel moulding sand:

<i>Disposal</i>	<i>Lots</i>	<i>Parcels</i>
Passed as free from pests . . . . .	911	21,827
Fumigated . . . . .	4	13
Burned . . . . .	34	43

Total inspected . . . . . 949 21,883

Of these shipments 21,827 packages arrived as freight, 43 packages by mail and 82 packages as baggage of passengers.

#### *Rice.*

During the month 22,386 bags of rice arrived from Japan which, after close inspection, was found to be free from pests and was passed for delivery.

#### *Pests Intercepted.*

Seventeen packages of fruit and 13 packages of vegetables were found in the baggage of passengers and immigrants from foreign countries. These were all seized and destroyed by burn-

ing. One package of chestnuts was taken from a passenger which was found badly infested with a chestnut weevil (*Balaninus species*). Several packages of pears infested with codlin moth were seized and destroyed. A package of medicinal herbs from Japan in the mail was badly infested with *Lepidopterous* larvae and the material burned. In a box containing violet plants from California was found a nest of the small black honey ant (*Prenolepis imparis*). After fumigation the plants were repacked in clean moss and the old material burned.

Three packages of sugar-cane from Argentina arrived by parcel post for the director of the H. S. P. A., and he gladly turned these over to me and they were burned. The sending was unsolicited by the station.

(One package of soil from Singapore arrived by freight and the consignee gladly turned it over to us to destroy by burning.

On the return of the *Luka* from Palmyra Island, the inspectors found two land-crabs on board and as these are prohibited under regulations of the Board they were killed. These crabs are very destructive, not only to coconuts but also to all kinds of vegetables, and it is fortunate that the species does not exist in Hawaii despite the fact that they are considered a delicacy even surpassing the lobster in taste.

### *Queenbees.*

Six queenbees arrived in the mail and after examination, the packages bearing a certificate by the State inspector, they were permitted entry.

### *Hilo Inspection.*

Brother M. Newell reports the arrival of six steamers and two sailing vessels. The six steamers carried vegetable matter consisting of 214 lots and 3365 packages. Of these 10 boxes of pears were badly infested with codling moth and were dumped at sea.

### *Beneficial Insects.*

During the month 28 lots of Japanese beetle fungus were furnished applicants on Oahu and 1 box sent to an applicant at Hilo. The beetle has been unusually abundant, destroying many plants in well kept places. One colony of fig wasps was sent to Kohala, Hawaii. The colony was secured from Moanahua where this wasp was successfully introduced several years ago and where it can always be found in the Capri figs.

### *Inter-Island Inspection.*

During the month of August 57 steamers were attended to and the following shipments were passed:

Plants . . . . .	856 packages
Fruits . . . . .	12 packages
Taro . . . . .	700 packages

Total passed . . . . . 1568 packages

The following packages were refused shipment:

Fruit . . . . .	9 packages
Plants . . . . .	28 packages

Total . . . . . 37 packages

These were refused shipment on account of infestation and soil attached.

During the month I visited Hilo for the purpose of going over the work with the local inspector, Brother Newell, and also for the purpose of looking into existing conditions for the future welfare of the horticultural quarantine work. Brother Newell and I visited every available warehouse to ascertain whether or not any of them could be used for fumigating the rice shipments which are now being shipped to Hilo, direct, from Japan. One of these could be used by lining the lower portions and floor with heavy building paper. We also visited the new rice mill which is located in a very convenient place so that all the rice which is consigned only to this mill could be hauled directly to the mill from the landing and cleaned as fast as hauled; and in this way infested rice, should any arrive, would not become a menace. However, if infested rice is stored for a time all pests infesting same have a chance to escape. Especially is this true if rice goes through a sweating. The milling of uncleaned rice does much toward eliminating rice pests if the rice is handled immediately upon arrival.

I also had an opportunity while at Hilo to be present at the arrival of a large shipment of fruit from the Coast by the steamer Enterprise. I watched the inspection of these shipments very closely and I am pleased to say that it is done in a very thorough manner.

While on Hawaii the president of the Board of Agriculture and Forestry requested me to accompany him through Puna, Kau and Kona districts to aid him in the distribution of parasites of the Mediterranean fruitfly and the hornfly, it being rather difficult for one man to handle large quantities of these perishable insects. I was glad of the opportunity to visit these localities as it gave me a chance to study in a limited way some of the pests which people often complain about. Wherever I could, I also made investigations of ferneries to ascertain whether the fern weevil (*Syagrius fulvitaranus*) had made its appearance in these districts;



and I am pleased to report that my observations failed to reveal any evidence of the presence of the fern pest, nor could anyone report having observed any injury to their ferns.

Respectfully submitted,

E. M. EHRLHORN,  
Superintendent of Entomology.

## DIVISION OF FORESTRY.

Honolulu, July 31, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I have the honor to submit as follows the routine report of the Division of Forestry for July, 1913:

During the first fortnight of the month I was in Honolulu engaged with routine work, in part pertaining to the closing of the former fiscal period and with getting under way forest projects under the new financial allotment. A brief report of the work of the Division of Forestry for the past fiscal year was prepared and sent to the Governor to be included in his annual report.

### *Forest Planting on Tantalus.*

Pursuant to directions of the Board, a plan was worked out early in the month, on the ground, for the replanting with native Hawaiian trees, koa and kukui, of the slopes of Sugar Loaf, at the head of the side valley running up from Makiki, below Round Top. Koa seedlings already in the nursery will be set out as soon as there is favorable weather for planting. In the meantime work has been started on a service trail across the slope. The upper slopes will be planted with koa; lower down in the valley kukui will be used. A supply of kukui seedlings is now being got ready.

### *Inspection Trip—Bishop Estate Land, Kawailoa.*

On July 10, in company with Mr. G. H. Gere, I made an inspection of certain wood cutting operations on a tract of Bishop Estate land at Kawailoa, Oahu, which I followed by a letter of recommendations to the trustees. Visits of this character form a regular part of the duty of the Division of Forestry. Upon request advice upon any sort of forest work will be furnished any owner of forest land, the only proviso being that the applicant pay the traveling expenses of the agent sent.

*Visit to Island of Maui.*

From July 16 to August 2, I was on the Island of Maui looking generally into forest reserve matters, but with particular reference to forest reserve boundaries. I made a complete circuit of West Maui, seeing the forest line above Honolua, Lahaina, Olowalu, Wailuku and Kahakuloa; traversed the Koolau forest reserve along the East Maui ditch system, looking especially into the tree planting work that has been going on there under the general direction of this office; visited various points on the forest reserve line above Nahiku and Ilana, to see where and how much fencing of that boundary was required; and checked up on the condition of a portion of the fence enclosing the Makawao forest reserve that I had not seen for some time. My findings from this trip will shortly be presented to the Board as a special report. Incidentally I had while on Maui a number of conferences about forestry matters with the people interested, when various details were talked over and arranged.

Above Wailuku I had the pleasure of visiting the areas at the base of the steep ridges, above the cane fields, that have been planted with trees by the Wailuku Sugar Company during the past four years. These plantations are making a really remarkable growth considering their location on exposed ridges. Within a short time now the trees will have reached a size sufficient to be easily seen from the main road. The purpose of the planting is to put to use land that would otherwise be waste area and to prevent further erosion. Several species of eucalypts have been used, with ironwood and silk oak, and, beyond Waikapu, algaroba.

*Forest Nurseryman's Report.*

As usual the report of the forest nurseryman is transmitted herewith. One point not noted therein was a visit to Fort Kamohamcha, where suggestions were made to the commanding officer in regard to the planting of trees and ornamental shrubs. Some plant material has already been furnished for use at this post. Later it is expected that a more detailed plan will be worked out, with which this Division will assist.

Very respectfully,

RALPH S. HOSMER,  
Superintendent of Forestry.

REPORT OF NURSERYMAN.

Honolulu, July 31, 1913.

Mr. R. S. Hosmer, Superintendent of Forestry.

Dear Sir:—The following report gives the principal work done during the month of July:

*Nursery.**Distribution of Plants.*

	In seed boxes	In boxes transplanted	Pot Grown	Total
Sold . . . . .	....	....	338	338
Gratis . . . . .	1000	....	584	1584
	<hr/> 1000	<hr/> ....	<hr/> 922	<hr/> 1922

*Collections.*

Collections on account of plants sold amounted to.....\$ 7.45  
 Rent of building, nursery grounds, for month of June.... 35.00

Total . . . . . \$42.45

The forestry cottage on Tantalus has been overhauled and put in good repair.

*Experiment Garden, Makiki.*

The assistance of one of the men was required in the repairing of buildings, etc., and about two weeks have been spent on this work, other work done being the regular routine work.

*Honolulu Watershed Planting.*

A commencement was made on July 14 to make arrangements for the planting of part of Sugar Loaf and the adjoining valleys. Two men have been at work making trails and collecting kukui seed and plants. The planting of koa on the higher and exposed places and of kukui along the bottoms and lower sides of the slopes is the plan agreed to be followed. We have at the Makiki Station about 1000 pot grown koa trees ready to set out and we are propagating more from seed. The kukui we are propagating from seed and also picking up a number of sprouted plants from under the trees. Those will be potted off and allowed to grow until they are good, strong plants before setting out.

*Plantation Companies and Other Corporations.*

The distribution of plants during the month amounted to 12,000 in seed boxes, 2600 in transplant boxes and 400 pot grown. Total 15,000. Orders have been received for 6000 in transplant boxes and 40,000 in seed boxes to be delivered during the next four months.

*U. S. Experimental Planting, Nuuanu Valley.*

The man has been doing the regular routine work transplanting and attending to the trees that have been planted out.

Very respectfully,

DAVID HAUGHES,  
 Forest Nurseryman.

## REPORT FOR AUGUST.

Honolulu, August 30, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I beg to submit as follows the routine report of the Division of Forestry for August, 1913.

Returning on August 2 from a field trip to Maui that covered several weeks in July, my own time this past month has been largely spent in the office in attention to various matters of detail in connection with forest fencing projects now pending before the Board, and with the preparation for submission to the Board of several reports upon forest reserve matters.

*Inspection Trips.*

During the month I have made several short trips to points in the vicinity of Honolulu to look into questions in regard to the proposed Honolulu watershed reserve, and one to Waianae, to discuss on the ground with the manager of the Waianae Company the methods to be used in thinning a stand of algaroba trees on a tract of government land for which that company has recently secured a license to gather the beans.

For some little time certain of the trees along the Pali road, in the plantations started in former years by this Division, have been badly in need of pruning and thinning. About the middle of the month I went over the road with Mr. Haugh's, and indicated where trees should be pruned and openings for vistas made. A gang of Territorial prisoners furnished by High Sheriff Henry is now engaged, under Mr. Haugh's supervision, in carrying out this work. The essential purpose is by the removal of the lower branches to give an unobstructed view along the road, especially at curves, and also to open up vistas toward the mountains or the sea, where the growth along the roadside has become so dense as to cut off the view.

During the month substantial progress has been made in the preliminary steps leading to the planting of the open area on Tantalus, on the slopes of Sugar Loaf. As is usual every month, numerous requests for advice about tree planting and for plant material have been received and given attention. I transmit herewith the report of the forest nurseryman which outlines this side of the forest work more in detail.

*Forest Fires.*

Forest fires were reported during August as follows:

By Mr. C. C. Conradt, Pukoo, Molokai. A fire on July 23 that burned over about 100 acres of grass and brush land near Wai-ahua, Molokai.

By Mr. Gaylord P. Wilcox, Kealia, Kauai. A fire that escaped from a homesteader at Waipouli and burned over between 200 and 300 acres of grass land and into a grove of koa and kukui on the Nouou ridge, Kawaihau, August 8, 1913.

By Mr. W. M. Templeton, Wahiawa, Oahu. Two fires on the military reservation above the Wahiawa colony, on the land of Waianae-uka, one of which endangered to some extent the forest on the Territorial forest land of Wahiawa.

These last fires were put out by troops sent from Schofield Barracks upon request of Mr. Templeton. That at Waipouli by a gang of laborers got together by Mr. Wilcox. The Molokai fire was extinguished by a shower following a fortunate turn of the wind.

Action in regard to fixing the responsibility for the fires on Molokai and Kauai is now pending before the Board.

Very respectfully,

RALPH S. HOSMER,  
Superintendent of Forestry.

#### REPORT OF NURSERYMAN.

Honolulu, August 30, 1913.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir:—The report for the month of August is as follows:

#### *Nursery.*

##### *Distribution of Plants.*

	In seed boxes	In boxes transplanted	Pot Grown	Total
Sold . . . . .	3000	50	191	3241
Gratis . . . . .	.....	200	787	987
	3000	250	978	4228

##### *Collections.*

Collections on account of plants sold amounted to.....	\$ 6.90
Collections on account of seed sold amounted to.....	.50
Rent of building, nursery grounds.....	35.00
Sale of box shooks.....	8.25
Reimbursement for ½ of postage on book entitled "Indigenous Trees of Hawaii" (Rock) according to agreement with College of Hawaii.....	3.25
Total . . . . .	\$53.90

*Plantation Companies and Other Corporations.*

The distribution of trees under this heading amounted to 10,000 seedlings.

*Seed Collecting.*

We have been trying for the past month to collect koa seed, and the different valleys and groves from Palolo to Kalihi have been searched. Llewellyn Dowsett, with the aid of a man kindly granted by Mr. Meyer of the Waianae plantation, has explored the Waianae and Nanakuli gulches with the result of finding only a few good seed. The borer has destroyed the crop almost entirely this season and we have been able to collect only a few ounces of good seed.

*Trimming of Trees Along the Pali Road.*

Considerable trimming of trees and cutting down of brush along the Pali road has been done with the assistance of a luna and a gang of prisoners kindly granted by Sheriff Henry. Several of the dangerous corners where the brush and trees shut off the view of the road, making it risky for people driving automobiles and other vehicles, have been cleared of brush and the trees trimmed up. Other parts have been trimmed where the trees were thin and a good view could be obtained by trimming off a few branches.

*Experiment Garden, Makiki.*

The principal work has been the transplanting of seedlings and doing of other routine work.

*Honolulu Watershed Planting.*

Before any planting could be done on Sugar Loaf we found it necessary to cut convenient trails so that plants and other material could be packed to where it was wanted with the least possible delay. We have therefore cleared a trail from the Makiki station right along the east side of the ridge to the east of the station, up to and along the face of Sugar Loaf to connect with the Round Top trail. This trail is now completed and a start at making holes and planting will be commenced during the early part of September. A considerable number of koa and kukui trees are being got ready for planting.

*U. S. Experimental Planting, Nuuanu Valley.*

A number of trees are now ready at the small nursery for planting and as soon as the weather is suitable they will be planted out. The man has been caring for the trees at the nursery and doing other routine work.

Very respectfully,

DAVID HAUGUS,  
Forest Nurseryman.

## DIVISION OF HYDROGRAPHY.

Honolulu, August 15, 1913.

Board of Commissioners, Agriculture and Forestry.

Gentlemen:—The following report of operations in the Division of Hydrography for July, 1913, is submitted:

*G. K. Larrison, Superintendent:*

On July 1 and 2 a reconnaissance, which was begun on June 30, was made of the Kahana, Waikane, Uwau, Waianu and Waiahole valleys on windward Oahu, and the Waiawa valley in central Oahu. All streams in these valleys are being rated by weirs by the Waiahole Water Company. Current meter measurements were made to check the weirs, which were found to give discharges from ten to fifty per cent. too high. The weirs were found to be in poor condition, with leakage, high velocity of approach, and with blunt uneven crests. One daily reading was being made at each station except on Sundays. The condition of these stations was reported to the chief engineer of the Waiahole Water Company. It is possible that a number of clock register stations will be established by the company, to be maintained and operated by this office.

On July 9th, Messrs. Dort, White and the undersigned made a reconnaissance to develop a direct trail between the stations on the north and south forks of the Kaukonahua streams. The trail was broken through from the south fork to within a short distance of the north fork stations, but the attempt was abandoned on account of topographical difficulties.

On July 10 a reconnaissance was made, in company with the Superintendent of Forestry and the chief engineer of the Bishop Estate, of the lower Kawaihoa region.

On July 19, accompanied by Mr. H. Kimble, assistant engineer, the writer sailed for Kona, Hawaii, and the balance of the month was spent on a field reconnaissance in that district.

The balance of the month was spent in general administration work.

*J. C. Dort, Office Engineer, Oahu:*

On July 1 the rain gages on Konahuanui, 3100 feet; Mt. Olympus, 2440 feet, and Kaau Crater, 1700 feet, were read.

On July 9 a trail reconnaissance between the south and north forks of the Kaukonahua was made.

On July 14 a site was selected for the Kalihi stream gaging station at an elevation of about 500 feet above the sea level. This stream will probably be utilized to augment Honolulu's water supply.

On July 22 the three stations of the north and south forks of the Kaukonahua were visited, and records obtained.

The balance of the month was spent in general cost data, accounting, computing, and general office work, including reports for the annual reports of the Governor and the Superintendent of Public Works, for the fiscal year ending June 30, 1913.

*C. T. Bailey, Assistant Engineer, Maui:*

Mr. Bailey made ten regular and fifteen miscellaneous stream measurements, visited one rain gage, and made a reconnaissance trip covering seven days from Keanae to Kaupo. The cable for the Honokahau station was also erected. The greater part of the month was spent in routine gaging and maintenance work.

*E. O. Christiansen, Assistant Engineer, Hawaii:*

One regular and six miscellaneous stream measurements were made and twelve rain gages were read. On July 5 all construction on the 2700 foot trail was suspended. On July 15 a conference relative to future plans was had with the Superintendent of Hydrography in Honolulu, and from July 18 to 31 all equipment on Hawaii was brought from the 2700 foot trail by packers to Hilo and shipped to Maui.

*Howard Kimble, Assistant Engineer, Kona, Hawaii:*

Arrived in Honolulu on July 15, and sailed for Kona, Hawaii, on July 19. From July 20 to July 31, a saddle reconnaissance was made in company with the Superintendent of Hydrography of the Kona districts above the upper government road, extending from Honokahau on the north to Kealia on the south, ranging from 1000 feet to 6100 feet above sea level. Practically all water holes in this area were visited.

*W. F. Hardy, Field Assistant, Kauai:*

Mr. Hardy made six regular stream measurements and visited sixteen rain gages and two evaporation stations.

Five days were spent on cross section trail and bridge improvement work. Three old staff gages were replaced by new gages. The greater part of the month was spent in general gaging and maintenance work.

*D. E. Horner, Field Assistant, Kauai:*

Mr. Horner assisted Mr. Hardy on general improvement work. Six rain gages were visited, two days were spent painting gages, twelve days on trail cutting and construction, five days on improving cross sections and three days on repairing the Waianea station bridge.



*G. R. White, Field Assistant, Oahu:*

On July 1 and 2 Mr. White accompanied the superintendent on a reconnaissance of the Kahana, Waikane, Uwau, Waianu, Wai-ahole and Waiawa valleys. On July 9 a trail reconnaissance trip was made between the south and north forks of the Kaukonahua. On July 11 the two stations on the north fork of the Kaukonahua were visited and two measurements were made. On July 25 the station on the south fork of the Kaukonahua was visited. The balance of the month was spent on general computations and office work.

*E. E. Goo, Recorder, Honolulu:*

The entire month was spent on general office work, including correspondence, filing, computing, indexing, etc.

*R. M. S. Goo, Computer, Honolulu:*

The entire month was spent on general office work, including filing, computing, etc.

*August Plans:*

*Kona Investigation:* Mr. Kimble will assemble a working map of the Kona districts, from existing government and privately owned maps. A population and present water supply census will also be started. Field investigations and surveys are impracticable at the present time on account of the heavy rainfall. This work will be taken up later, as the rains usually stop about September 30. Mr. Kimble has been directed to employ a field assistant at \$75 per month without subsistence, who will furnish his own saddle transportation.

Mr. Christiansen will report to Mr. Bailey about August 8 to assist in the establishing of new clock register stations and general improvement work on Maui.

*Oahu:* A Friez clock register station will be established on the Kalihi stream and a reconnaissance of the Laie valley on windward Oahu will be made at the request of the Governor.

*Promotions:* W. V. Hardy, field assistant, was promoted to \$1800 per annum July 1, 1913.

G. R. White was appointed field assistant at \$1020 per annum July 1, 1913.

*Hawaii Progress Report:* Five hundred copies of Water Supply paper No. 318, U. S. Geological Survey, for the Hawaii District, up to December 31, 1911, were received July 31, and will be distributed in August. Copies of this report may be had free of charge by application to the undersigned.

Very respectfully,

G. K. LARRISON,  
Superintendent of Hydrography.

## REPORT OF AUGUST.

September 4, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—The following brief report of operations of the Division of Hydrography during August, 1913, is submitted:

*G. K. Larrison, Superintendent.*

August 1 to 8 were spent on making a reconnaissance of North and South Kona, Hawaii, in connection with the water investigation of these districts as authorized by Act 102 of the 1913 Legislature. This reconnaissance was started on July 19. On August 15 a reconnaissance was made of the lower Laie valley and on August 23 a reconnaissance was made of the upper Moanalua valley to determine the feasibility of establishing stream gaging stations. A further investigation will be made of the Laie valley. On August 21 an inspection was made of the two coöperative stations installed by the Wahiawa Water Company on the north fork of the Kaukonahua stream on Oahu, in company with W. W. Goodale, T. H. Petrie and J. C. Dort. August 27 to 29 were spent on Kauai on general inspection and consultation work which included a reconnaissance of the Waimea gorge and its principal branches. The stream beds were followed up to an elevation of about 900 feet above sea level, and future stream gaging station sites were located. The balance of the month was spent on general administration work, including the overseeing of the construction of the new clock register stream gaging station on the Kalihi stream.

*J. C. Dort, Office Engineer, Oahu:*

On August 1 the Pali and north fork Kaukonahua rain gages were read. On August 8 an investigation was made of the quantity of water developed in the Waiahole Water Company tunnel. The measurement showed that 17 million gallons per day were being picked up in the tunnel proper. On August 21 an inspection trip was made, in company with the superintendent, W. W. Goodale and T. H. Petrie, of the two new coöperative stations on the north fork of the Kaukonahua. August 26 to 31 were spent on the construction of the new clock register stream gaging station on the Kalihi stream. August 11 and 12 were taken on sick leave.

The balance of the month was spent on general office work, including computations, drafting, reports, etc.

*C. T. Bailey, Assistant Engineer, Maui; E. O. Christiansen,  
Assistant Engineer:*

Mr. Bailey, assisted by Mr. Christiansen, visited 46 stream gaging stations, made 21 stream measurements, and set four bench

marks. The balance of the month was spent on general maintenance work, including the improvement of several stream gaging station cross sections, unpacking equipment received from Hawaii, and on computations and correspondence. Mr. Bailey spent 15 days in the field and 16 days in the office. Mr. Christensen spent 17 days in the field and 14 days in the office.

*W. I. Hurdy, Field Assistant, Kauai; D. E. Horner, Field Assistant.*

Mr. Hardy, assisted by Mr. Horner, visited 30 stream gaging stations and 9 rain gaging stations. Four stream measurements were made. About twenty miles of trail was constructed and about a dozen stream gaging station cross sections were cleared by blasting and by removing boulders. Mr. Hardy spent 26 days in the field and 5 days in the office. Mr. Horner spent 28½ days in the field and 2½ days in the office.

*Howard Kimble, Assistant Engineer, Kona, Hawaii; H. R. Wassman, Field Assistant.*

The special water investigation of North and South Kona has progressed favorably and more rapidly than was expected. A reconnaissance of both districts was completed on August 7. Since that time a general map covering all water bearing areas has been started, a population and present water supply census has been made, and 18 rain gages have been established.

H. R. Wassman was employed as a field assistant on August 18 at \$75 per month without subsistence.

*G. R. White, Field Assistant, Oahu.*

In the absence of the clerk on leave Mr. White handled the office work from August 8 to 28. On August 1 the mountain rain gages on Konahuanui, Olympus and Kaau crater were read. On August 4 the Waiahole-Waiawa rain gage was read. August 28 to 31 were spent on the construction of the Kalihi clock register stream gaging station.

*E. E. Goo, Clerk.*

Mr. Goo was on leave August 9 to 28. The balance of the month was spent on general office work, including correspondence, computing, filing, etc.

*R. M. S. Goo, Computer.*

The entire month was spent on computing, blue printing, and general office work.

*September Plans.*

*Oahu:* The construction of two clock register stream gaging stations on the two branches of the Manoa stream will be started.

Considerable blasting and clearing of the cross sections of six stations on windward Oahu will be begun. A further reconnaissance of the Laie valley and weir checking measurements on the Wahiawa Water Company's main ditch will be made.

*Kauai:* The construction of four new clock register stream gaging stations on the Wainiha, Lumahai, Hanalei and Kalihiwai streams will be started, and general trail improvement work will be continued.

*Maui:* The construction of nine new clock register stream gaging stations will be started. The undersigned will spend the last two weeks of the month on Maui selecting the sites for these stations.

*Kona, Hawaii:* The investigation will proceed along the same lines followed in August.

*Stream Gaging Stations Maintained.*

Island	Aug. 1, 1913	Discontinued	Established	Sept. 1, 1913
Kauai . . . . .	42	....	....	42
Oahu . . . . .	25	....	1	26
Maui . . . . .	46	....	....	46
Total . . . . .	113	....	1	114

In addition to the above private records are furnished for stream and ditches as follows: Kauai, 10; Maui, 17; Hawaii, 2; total, 29.

*Main Gaging Stations Maintained.*

Island	Aug. 1, 1913	Discontinued	Established	Sept. 1, 1913
Kauai . . . . .	28	....	....	28
Oahu . . . . .	9	....	1	10
Maui . . . . .	18	....	....	18
Kona, Hawaii. . . .	...	....	18	18
Total . . . . .	55	....	19	74

In addition to the above private records are furnished for rain stations as follows: Kauai, 6; Oahu, 1; Maui, 16; Hawaii, 11; total, 34.

Very respectfully,

G. K. LARRISON,  
Superintendent of Hydrography.

The new Chinese republic has established a department of agriculture and forestry. For a long time China had been pointed out as the most backward nation in forest work.

## THE KALO IN HAWAII. III.

By VAUGHAN MACCAUGHIEY and JOSEPH S. EMERSON.  
VARIETIES.

There are a great many varieties of kalo. The subject has never been thoroughly studied. Barrett divides the kalos roughly into three groups:

- a. Kalos with striped petioles.
- b. Kalos with red petioles.
- c. Dasheen kalos, or those which produce tubers about the corm.

From a commercial standpoint the varieties differ from one another in the size, form, color, flavor, and general quality of the corm or tubers; in the time needed for maturity; and in the amount of water needed for growth. The matter of varieties of Hawaiian kalo is one that is worthy of careful investigations. The authors have found that the natives have over two hundred and fifty names for varieties of kalo. Some of these names are undoubtedly synonyms, but the fact remains that they habitually recognized as distinct forms at least 150 to 175 kinds. Concerning many of these varieties it has been possible to obtain somewhat detailed information. The U. S. Agricultural Experiment Station, through its sub-station in the Hilo, Hawaii, district, is collecting and planting varieties obtainable at the present time. Some of the types are already extinct. With the rapid decline of Hawaiian lore, and with the transferral of kalo production from the Hawaiians to the Chinese, the Hawaiian's knowledge of the kalo must be quickly recorded or lost forever.

The following list includes all of the varietal and subvarietal names collected by the authors. The majority of these names have been checked and verified:

## HAWAIIAN NAMES FOR KALO VARIETIES.

1. A'A. Grown chiefly in unirrigated fields, sometimes in *lo'i*. It is not commonly grown at the present time; does not occur on Oahu, but is grown somewhat on Hawaii. The interior of the corm is whitish or gray. The leaf blade and petiole is clear green, unmarked. The blade is somewhat convex, or saucer shaped (*apiipii*) like *Apuwai*. The poi is likely to be watery (*hehee*) and lacking in the proper consistency; it therefore requires considerable skill in pounding.

2. AAPU. There are three sub-varieties of this kalo. The names of two are not known to us.

3. AAPU LEHUA. Said to be synonymous with *Kumu* q. v.

4. AHAKEA. This name is known on Oahu as a synonym for *Haokea* q. v. Corms under this name were sent in 1908 to the U. S. Dept. of Agriculture, by Mr. L. C. Lyman, of Hilo.

5. *Am.* This is a wild kalo, never grown in *lo'i*, but occurring spontaneously in uncultivated marshy places. The interior of the corm is suffused with reddish or brownish, the corm is markedly smaller than the cultivated kalo, and is inferior to them in quality. It was eaten only in times of scarcity. The leaf blade



KALO PI'TALI'I KEOKEO.

The corms are about six inches long. Note the length of the petioles, their white bases and smooth texture. Note the true roots that emerge from the corm.

and petiole is also suffused with reddish or purple; the young leaves make excellent *hi'au*.

6. AIMAHANA. Probably a synonym of *Mahaha* q. v.

7. AKIAHIALE.

8. AKOKI. This name is known on Oahu.

9. AKOLE KA UULA.

10. ALA. A synonym for *Manahaulaula*. *Ala*, fragrant, refers to the fragrance of the corms when cooked.

11. ANELI'I.

12. API'I. Also called *Ipui-pui*. Two sub-varieties, *kea* and *ulaula*, as follows:

13. API'I KEA. This kalo, in the characteristics of corm and huli, strongly resembles the *Ila'okea*, but may be distinguished from it by the shape of the leaf-blade, that of *Ipui'kea* being somewhat orbicular (*poi-poi*) while that of *Ila'okea* is quite elongated. The *poi* is of good quality, and light gray in color. This kalo in early times was among the favorite varieties of the chiefs.

14. API'IPI'I. Synonym for *Ipui* q. v.

15. API'I ULAULA. A large kalo, formerly cultivated for offering to the gods, and other sacred purposes. Not raised for common or general uses, but used by the kahunas in their rites. The interior of the corm is dark gray.

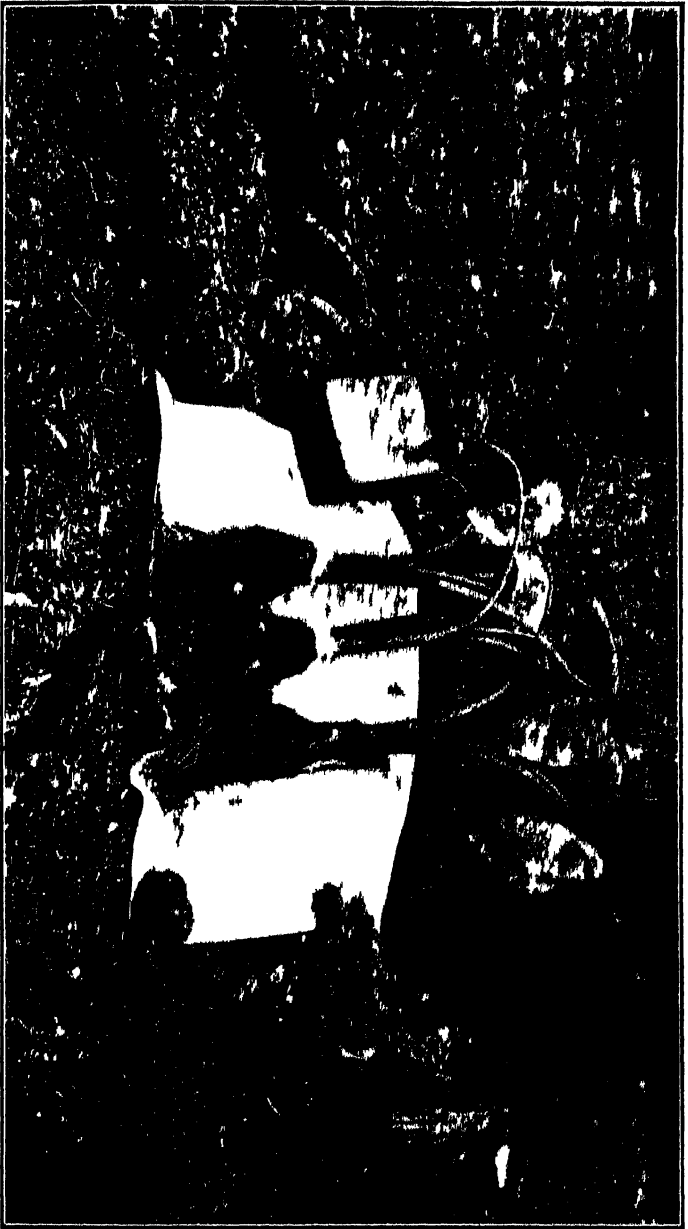
16. APO. A wet land or *lo'i* kalo, raised abundantly on Oahu. The interior of the corm is white. The petioles are quite dark greenish, sometimes almost purple-black. The corm makes very good *poi*. This kalo was not considered suitable for offering to the gods.

17. APOWAI. Probably a synonym for *Apuwai*, q. v.

18. APOWALE. A name known on Oahu.

19. APUWAI. The leaf-blade of this variety is convex or cup-shaped, catching and retaining the rain water. Hence it is likened to a water-cup (*apu-wai*). There are two sub-varieties, *keokeo* and *ulaula*, as follows:

20. APUWAI KEOKEO. Cultivated, and also sometimes occurring wild in wet places near the woods. It is raised exclusively in *lo'i*, and is common throughout the islands, well-known localities being Kohala, Hawaii; Wailuku, Maui, and Pauoa, Oahu. That raised in the *ahupuaa* of Dole in olden times had the reputation of being the best kalo grown in Kohala, and was always preferred to other kinds. The Chinese planters in Kohala, who previously raised *Piko*, have given it up, and now raise *Apuwai* because it matures three months sooner than the former. It was formerly raised in Nuuanu, Oahu; and also in Kalihi, but in the latter valley it is now supplanted by the *Hachae*, q. v. The corm is white within, soft in consistency, and easy to potnd and make into poi. The leaf-blade and petiole is dark green. The blade is cup-shaped, with a crinkled margin, and the entire surface is somewhat wrinkled. The *piko* is darker than the surrounding area.



# KALO UAT A

Pripped against the base of a mango tree. Note the shape of the  
 coins, the fibrous roots, the venation and texture of the leaf blades and  
 the arrangement of petioles with respect to one another. Behind the tree  
 is a large poi board.



This kalo is good either steamed or as *poi*; the leaves make good *lu'au*. This kalo requires about twelve months for maturity.

21. **APUWAI ULAULA.** This kalo is similar to *Apurwai keokeo* save as to the color of the corm and petiole, which are reddish or pink. The upper portion of the corm is markedly suffused with pink. The petioles are purplish at their bases. The *poi* is pink, and is superior to that of the *Apurwai keokeo*, which is soft and mushy. The *poi* of this kalo was highly esteemed by the chiefs in ancient times.

22. **AUAULEONU.** Grown only in unirrigated fields, never in *lo'i*. Raised commonly in Kona, Hawaii. The interior of the corm is whitish, and makes good *poi*. The foliage parts are clear green with no conspicuous markings.

23. **AWEOWEO.** This variety is also known under the name of *Aweuwewu*, *Mamauweco*, or *Ma'auweco*. It is sometimes erroneously called *Ka'i aweuwewu*. The name *Aweoweco* refers to the very shaggy or fibrous exterior of the corm. *Mamauweco* indicates that the corm is tasteless (*ono-ole*), and unpalatable. This is a wild kalo, growing in wet and marshy places near the forest line, with ferns and similar plants. It does not grow satisfactorily when planted in *lo'i*, as it forms an abundant top, but no corm. The corm is small, hard, and whitish within. It cannot be eaten when steamed, because of its pronounced acidity, but must be made into *poi* before eating. The *poi* is of good quality, but the corms are so small and scattered that they are used only in times of scarcity, when other food fails. This kalo has a spreading habit, the corm sending out underground offshoots, and so the natives sometimes refer to this as *na-kalo-i-ku-e*, "the kalo that separates itself," or "stands by itself." The foliage is clear green; the petiole sometimes darker. The leaves are good for *lua'u*. This variety was not considered suitable for medicinal purposes, nor for offering to the gods.

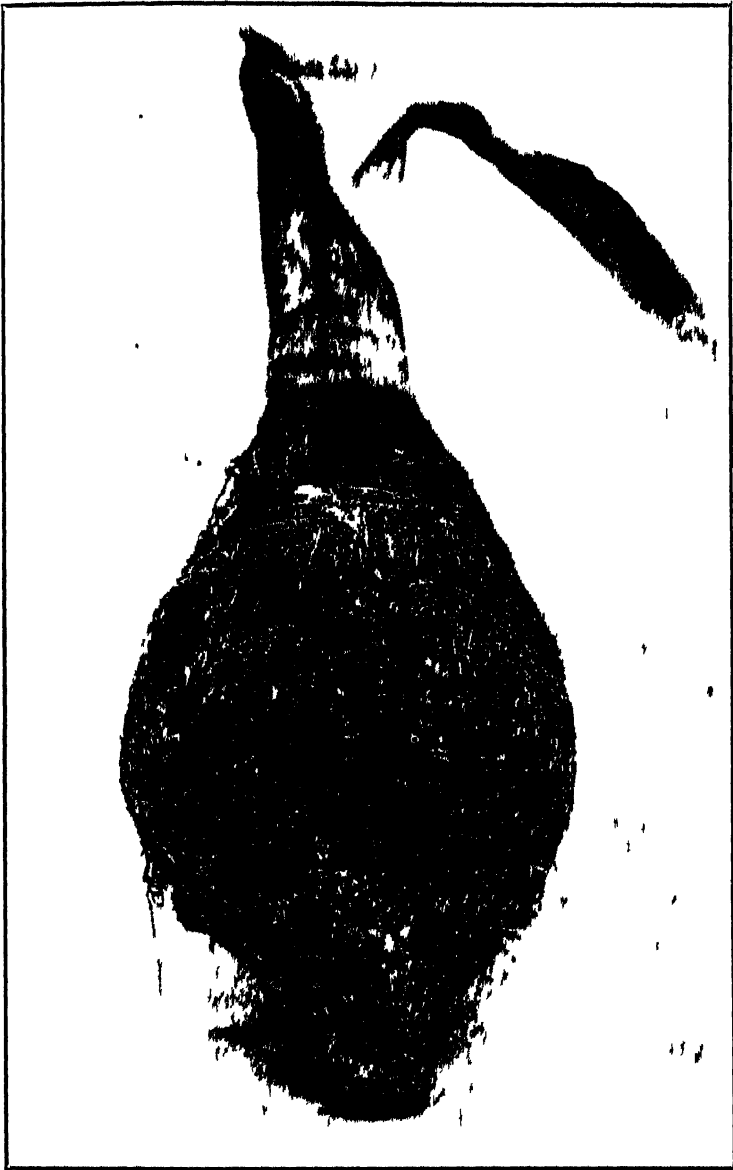
24. **AWEUWEU.** Synonym for *Aweoweco* q. v.

25. **ELEE.** Probably a synonym for *Eleele*, q. v.

26. **ELEELE.** Cultivated both in unirrigated fields and in *lo'i*. The interior of the corm is dark gray, very similar to that of *Popolo*. The leaf-blade is dark green, the petiole is dark purplish green. This variety was not considered suitable for medicinal purposes, nor for offering to the gods. The young leaves make good *lua'u*, but care must be taken, in collecting the leaves, to gather but a few from each plant, else the corms will be stunted in their development.

27. **ELEELE NAIOLA.**

28. **ALEPAIO.** There are several fanciful explanations of the meaning of this name; according to some natives, this kalo grows spontaneously up near the woodlands where the beautiful *elepaio* bird makes its home. According to others, this kalo must be planted only at early dawn, while the *elepaio* bird is singing. It



CORN OF PI'IALUT ULAULA.

Weight: 502 grams. Dimensions: 14 cm. x 9 cm. This is a type of corn found commonly in the markets.

is usually planted in unirrigated fields, and is raised largely on Hawaii. The interior of the corm is suffused with yellow, the leaves are clear green, spotted or mottled with darker.

29. EULA. Synonym for *Eulu*, q. v.

30. EULU. *Ulu* means to grow, *ulu* has reference to growth in a spreading manner; this kalo sending out underground shoot or runners. There are two sub-varieties, *keokeo* and *kahu uwauwahi*, as follows:

31. EULU KEOKEO. Similar to the succeeding variety, save that the corm is white within, instead of yellow, and the petiole is clear green instead of blackish.

32. EULU KOIU UWAWAHII. This kalo is both wild and cultivated. It is grown in unirrigated fields, chiefly in Kona, Hawaii. The corm is yellow within, and is very acrid, being unsuited for eating immediately after cooking. The leaf-blade is clear green in color, and *rough* in texture. The petiole is quite dark, or blackish. The *poi* is good. Because of its pronounced acidity, this variety is not suitable for *lua'u*, nor for medicine. In unirrigated fields this variety matures in seven months, in *lo'i* it requires thirteen months. According to native tradition it must be planted only when the moon is waxing, never when it is waning.

33. HAAKEA. Undoubtedly a synonym for *Ha'okeo*, q. v.

34. HAAWIKEA. Perhaps a synonym of *Kaekeo*, q. v.

35. HAEHAE. This kalo grew originally in Kaanapali, Maui, a region where strong winds blow almost continually, so that the leaves of the kalo were tattered and torn (*hachac*). This name is sometimes erroneously spelt *hailai*. There are two sub-varieties, *keokeo* and *ulaula*, as follows:

36. HAEHAE KEOKEO. Cultivated both in unirrigated fields and in *lo'i*. Abundant in Kalihi Valley, Oahu, and in other parts of the islands. The corm is white within, and is *very large*, sometimes as big as a coconut, so that it must be cut into pieces before steaming in the *imu*. The leaves are also quite large, with long petioles (3-4 ft.), so that the ground is completely shaded, and the growth of weeds is prevented, rendering the field very easy to cultivate. This self-weeding habit makes it a lazy man's favorite. The petioles attain their greatest size in unirrigated fields. Formerly the *Apuwai* was the chief kalo of Kalihi, but after a time the corms became badly diseased. A native woman, Haele, introduced the *Hachac* from Kaanapali, Maui, because its large corms, even though partially decayed, could be profitably used, that is, a large portion remained after the decayed regions had been cut away.

37. HAEHAE ULAULA. Similar to the preceding, but with pinkish corm and *poi*.

38. HALOA. A name used on Oahu.

39. HAO.

40. HAOKEA. A well-known kalo, also called *Haakea*, *Haawikea*, *Ihakea*, and *Mahakea*, q. v. There are two sub-varieties, *haulaula* and *keokeo*.

41. HAOKEA HAULAUULA. Similar to *Ha'okea keokeo*, q. v., save that the corm and *poi* is somewhat pinkish. Also called *Ha'okea hauliuli*. This kalo was not considered suitable for offering to the gods.

42. HAOKEA HAULIULI. Synonym for *Ha'okea ulaula*.

43. HAOKEA KEOKEO. A cultivated kalo, never growing wild, but raised both in *lo'i* and in unirrigated fields. Was once grown abundantly in Paoa, Nuuanu and Kalihi, Oahu, but the Chinese planters of today prefer *Piiulii*. The interior of the corm is whitish; the corm forms a great quantity of *oha* (see propagation). The leaves are clear green, and resemble the leaves of *Alpuwai*. The *poi* is excellent. *Lua'u* of this kalo was formerly prized highly by the *kahuna*, as the kalo was considered very desirable for offering to the gods. The corms mature in eight months, they can remain in the ground for ten months without serious deterioration, but after this period they spoil and are worthless. The Chinese planters pull them at six months, but this is much too soon.

44. HAOLE LUATHINE. This kalo has an apt and comical native name. *Haole luathine* means "elderly foreign lady." Each period of growth of the corm of this kalo is closed by a pronounced constriction, so that a corm might be fancifully likened to the head and body of a person. The native women did not confine their bodies at the waists, and were, of course, greatly surprised at the constricted waists of foreign women. This kalo is therefore likened, in its constricted corm, to a plump, corseted, foreign woman. The interior of the corm is yellowish, and the petioles are also somewhat yellowish.

45. HAPU'U. See *Hapu'u kea*.

46. HAPU'U KEA. A kalo that is cultivated in damp places near the edge of the forest, both in *lo'i* and unirrigated fields, not growing wild. A notable locality for this variety is Koloa, near Hana, Maui. The corm is of large size, with whitish interior. The leaf is clear green, the base of the petiole is much darker. The *poi* is light colored, and good in quality. The *lua'u* is good. This kalo is not suitable for medicinal usage, nor for offering to the gods. It matures in one year.

47. HAPU'UPU'U. Synonym for *Hapu'u*, q. v.

48. ILEX. Raised in *lo'i* throughout Oahu. The foliage is clear green; the corm within is whitish. Connected with this kalo is an interesting ancient legend, which is given in outline herewith: *Kamapua'a*, the hog-god, struggled with *Pele*, the goddess who inhabited the volcano of Kilauea. He was vanquished and fled, first into the sea, then into the kalo *lo'i*, and finally into the forests. In each region he passed through five transformations,

in order to deceive and elude *Pele*. These transformations were—*hee*, *manini*, *kumu*, *puco*, and *kala*, so there are now five kinds of fishes, of *kalo* and of forest trees known by these respective names. *Pele* could not follow *Kamapua'a* into the *kalo lo'i* because her eyes were bleared with the salt water. *Hee* means "squid;" squid was a very acceptable offering to the gods: if one could not be obtained, the *huli* of this *kalo* might be taken and divided into eight parts, so that it resembled the squid in whose place it was offered, hence the name.

49. HEILIA.

50. HEKILI. *Hekili* (thunder) was a king of Maui, who died in 1791. He was noted because one side of his body was tatued black. This particular *kalo* was his favorite variety, so it was named after him. This *kalo* was raised in ancient times, both in *lo'i* and unirrigated patches, never occurring wild. It is rare now. The interior of the corm varies in tint from light to dark gray. The foliage has no special marking, save that the petiole is sometimes reddish. The *lua'u* is good. This variety is not used in the preparation of native medicines, although it was used by the *kahunas* in their sacred rites.

51. HELE MAUNA.

(To be continued.)

The Balkan War has brought about a rise in certain lumber prices in Europe because of the big demand for wood for ammunition boxes.

Dogwood, the principal source of shuttles for use in cotton mills, is growing scarcer year by year, and various substitutes are being tried, but with no great success.

Experiments with a tree planting machine at the Utah agricultural experiment station indicate that it may be used to advantage in reforesting old burned areas on the national forests.

The leading forest schools of the country not only have their own forest tracts for continuous experiments, but give their students actual experience in the woods by having them take part in big lumbering operations.

France has spent \$35,000,000 in planting trees on the watersheds of important streams.

According to the Canadian forestry association 50 per cent. of Canada is capable of growing nothing but timber crops.

A shingle mill in Maine uses 2000 cords of paper birch each year in the manufacture of toothpicks.

# Hawaiian Gazette Co.

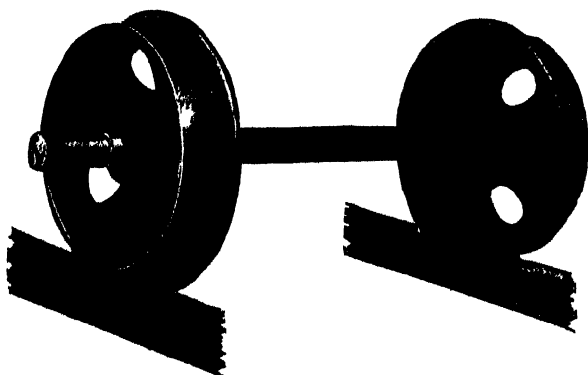
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# THE HAWAIIAN FORESTER AGRICULTURIST

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VOL. X.

OCTOBER, 1913.

No. 10.

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This number is featured with full details of recent forest reserve accomplishments.

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## *NEW PLANTS DISCOVERED IN STUDY OF GRAZING LANDS.*

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In making a study of grazing lands on the national forests, 125 entirely new species of plants have been discovered by the government's experts, and will be named and classified by the botanists of the Department of Agriculture.

Their discovery came about through the collection of some 9000 different plant specimens, with notes as to their habits of growth and forage value. This work is part of a comprehensive plan to determine the grazing value of every acre of national forest land, in which the capacity of the soil to grow certain forage crops is to be determined and an effort made to decide for which class of stock—sheep, cattle, or goats—the range is best suited.

The men who have made the studies have combined the qualities of practical stockmen and trained botanists. They divided the areas into such small subdivisions that maps have been prepared which show exactly the kinds of feed which grow on each acre, and the time of year it is ready for grazing. The maps also show the stock's water supply and indicate the kind of stock best suited to the area.

The investigation also showed the examiners many areas covered with flourishing plants which apparently should furnish excellent grazing, but which were not of a character relished by stock; these areas, therefore, had little or no stock-carrying capacity.

As a result of the study, the forest service announces that it will be in a position to perfect its system of grazing management to bring about still better conditions for both stock and range.



## DIVISION OF ANIMAL INDUSTRY.

Honolulu, October 6, 1913.

Hon. W. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry.

Dear Sir:—I beg to submit herewith a service report on the work of this division for the month of September, 1913. From this it will be seen that a number of the larger dairy herds in the city and county have been retested for tuberculosis, after an interval of only three months from the previous test, as compared to one year as hitherto practised.

The results are gratifying so far as the decrease in numbers of reacting animals is concerned, and careful post mortem examinations of said reactors demonstrate fully that the disease is practically wiped out, though not entirely so. This condition corresponds exactly with what is met with in other countries where efforts are being made to eradicate bovine tuberculosis, and also demonstrates that the work must be pushed to a finish now in as many herds or dairies as possible—or the work of years will have been wasted. If, for some reason or other, the disease cannot be eliminated from certain herds, such herds must be proclaimed or "posted" as infested until they have been freed from infected animals. To allow milk from known reactors—that is, cows proved to be infected with tuberculosis—to be sold for human consumption should no longer be tolerated, and when the disease has been reduced to such slight minimum as that which persists here at the present time, it would seem unwise not to carry this great piece of work to a successful end.

It is therefore recommended that every infested herd in the city and county be retested in short order, until the last reacting animal has been disposed of and the disease wiped out. There are now 74.28 per cent. of clean herds and only 25.72 per cent. remain to be dealt with further. When these have been attended to there only remains the problem of preventing a reinfection of the island through diseased cows from the other islands or from abroad. To this end it may become necessary to quarantine against the other counties, in so far as dairy cattle and products are concerned, until such time as these counties see fit to eradicate bovine tuberculosis. To prevent the entrance of fresh infection from abroad it will be necessary to amend the present regulations pertaining to the importation of live stock, to require that dairy cattle intended for importation here must come from clean herds; that is, herds certified to by the local health authorities to have been free from tuberculosis for at least one year, and to guard against infection in transit.

The international medical congress held in London this fall

came to the conclusion that it is far cheaper and more effective to eradicate bovine tuberculosis than to build hospitals, sanatoriums, Pasteurizing plants and surgical clinics to deal with the countless numbers of scrofulous (tuberculous) children which annually receive the infection through cows' milk. With this fact before us there can be no doubt that we are working along the right lines; that is, lines which were adopted here at least four years before the foreign authorities (England) were forced, by pressure of public opinion, to adopt exactly the same measures as have been pursued here for that length of time.

The above is a concise resumé of the present bovine tuberculosis situation in this county and as such is recommended for publication.

I have also under preparation a series of short articles dealing with various subjects of general interest to the live stock, dairy and poultry producers of the Territory, as, for instance—"Hog Cholera, its Curative and Preventive Treatment," "Eye Worm in Chickens," "Heart Worm in Dogs," and "Cerebro Spinal Meningitis or Blind Stagers in Horses and Mules." If the same meet with the approval of the Board it is recommended that the same be published and that a number of reprints of each article be secured for the future use of this division in furnishing information on the subject in question.

Very respectfully,

VICTOR A. NORGAARD,  
Territorial Veterinarian.

#### REPORT OF ASSISTANT VETERINARIAN.

Honolulu, September 30, 1913.

Dr. V. A. Norgaard, Chief of Division of Animal Industry.

Sir:—I have the honor to submit the following report for the month of September:

#### *Tuberculosis Control.*

The following dairy herds have been subjected to the intradermal tuberculin test:

		T.	P.	C.
Sept. 4-6	F. K. Makino.....	3	2	1
	Y. Tsudo .....	7	7	0
" 6-9	V. Bowen .....	1	1	0
" 8-11	F. Johnson .....	7	7	0
	E. C. Smith .....	8	8	0
	J. Schwenk .....	7	7	0
	T. Dado .....	10	10	0

Sept.	9-12—Waimanalo Plantation .....	23	23	0
	J. A. Templeton .....	39	39	0
"	10-13—Salvation Army .....	4	4	0
	J. Gouviera .....	8	8	0
	Frank Gomes .....	8	8	0
"	15-18—Waialae Dairy .....	90	88	2
"	16-19—Waialae Dairy .....	198	191	7
"	19-22—Waialae Dairy .....	128	124	4
	C. R. Frazier .....	3	3	0
"	22-25—Waialae Dairy .....	4	4	0
"	23-26—P. M. Pond .....	275	269	6

The above gives a total of 823 head of cattle injected and examined for the month, out of which number 803 were passed and twenty condemned and branded.

The following dairies remain to be tested and will be examined on the following dates:

Waianac Plantation .....	Sept. 29-Oct. 2
Y. Ogawa, Waialua .....	Sept. 30-Oct. 3
Waialea School .....	Sept. 30-Oct. 3
Kahuku Plantation .....	Sept. 30-Oct. 3
Laie Plantation .....	Sept. 30-Oct. 3

Outside of the O. R. & L. Ranch and the Kaneohe Ranch the fourth general test will be complete.

### *Importations.*

September 2—S. S. Wilhelmina, San Francisco: 21 crates poultry, 1 cat.

September 15—S. S. Sierra, San Francisco: 23 crates poultry.

September 16—S. S. Hilonian, Seattle: 16 horses, 12 cows, 1 calf, Alexander & Baldwin; 7 crates poultry.

September 23—S. S. Lurline, San Francisco: 26 mules, Schuman Carriage Co.; 3 polo ponies, W. F. Dillingham; 1 horse, A. L. Case; 1 dog, Mrs. Myatt; 25 crates poultry.

Respectfully submitted,

L. N. CASE,  
Asst. Territorial Veterinarian.

The Western Pacific Railway has instructed its engineers to report fires along the right-of-way where it traverses the Plumas national forest, California. The location of fires is indicated on a card dropped by the engineer or fireman to the next section crew met after the fire is discovered. It is then the duty of part of the section crew to go back on handcars or speeders and put out the blaze.

## DIVISION OF ENTOMOLOGY.

Honolulu, September 30, 1913.

Board of Agriculture and Forestry.

Gentlemen:—I respectfully submit the report of the work of the Division of Entomology for the month of September, as follows:

During the month 34 vessels arrived at the port of Honolulu, of which 22 vessels carried vegetable matter.

Disposal.	Lots.	Parcels.
Passed as free from pests.....	1,202	26,948
Fumigated . . . . .	4	82
Burned . . . . .	38	45
Treated before releasing . . . . .	1	1
Total inspected . . . . .	1,245	27,076

Of these shipments, 26,874 packages arrived as freight, 101 packages by mail and 101 packages as baggage of passengers. There were eight packages of vegetables and 28 packages of fruit taken from the baggage of passengers and destroyed.

*Rice.*

During the month 15,022 bags of rice arrived from Japan. Of this amount 500 bags of rice were found to be infested with rice weevil and rice moth (*Paralipsa modesta*). All other rice was found after close inspection to be free from pests and was passed.

*Pests Intercepted.*

Several shipments of pears and apples arrived and were found to be infested with codling moth.

*Paralipsa modesta* and *Colandra crysac* were found on rice from Japan.

Rose aphids were found on roses which arrived from San Francisco.

*Queenbees.*

Four queenbees were imported during the month of September.

*Hilo Inspection.*

Brother Matthias Newell reports the arrival of seven steamers and three sailing vessels, of which five steamers carried vegetable

matter, consisting of 207 lots and 3188 packages. After thorough inspection all were found to be free from pests and were passed.

### *Oriental Shipments.*

There arrived at Hilo, per S. S. Kiyō Maru, 6000 bags of rice, 235 bags of beans and six bags of sesame seeds. All of these shipments, being found free from pests, were passed.

### *Inter-Island Inspection.*

During the month of September inspections were made at 63 steamers and the following shipments were passed:

Taro . . . . .	549	bags
Plants . . . . .	387	packages
Fruit . . . . .	16	"
Vegetables . . . . .	54	"
Total passed . . . . .	1,006	"

The following packages were refused shipment:

Plants . . . . .	12	packages
Fruit . . . . .	11	"
Total refused . . . . .	23	"

These were refused shipment on account of infestation and of soil attached.

Respectfully submitted,

J. C. BRIDWELL,  
Asst. Superintendent of Entomology.

### DIVISION OF FORESTRY.

Honolulu, September 30, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I have the honor to submit as follows the routine report of the Division of Forestry for September, 1913, and to transmit, as usual, the report of the forest nurseryman, covering the parts of the work especially in his charge.

#### ROUTINE WORK.

During the first week of September I completed two special reports, accompanied by maps, on forest conditions on Maui,

and later in the month brought to the point of final action four forest reserve projects that are to be considered at a public hearing on October 8, viz: Kohala Mountain, Upper Waiakoa, Upper Olua, Hawaii, and Honolulu Watershed, Oahu. A good share of my time during the remainder of September has been given to the arrangement of details of forest fencing projects and in checking up, at the Land office, the exact requirements under government leases as to forest protection and fencing.

#### FOREST FENCING.

I am glad to report that, on September 22, the executive officer of the Board signed letters authorizing the construction of sections of fence on the forest reserve boundaries at Nahiku and at Makawao, Maui, and on September 25 authorized the construction of another similar fence at Molokai, Kauai. This action marks the actual beginning in the work of which it is expected the next two years will see a good deal—practical forest protection made possible through the use of the water revenues from the forest reserves.

#### HONOLULU WATERSHED.

On September 11, at the request of Major Cheatham, chief quartermaster for Hawaii, U. S. Army, there were cut, under my personal supervision, in the Tantalus forest, near the Halfway house, nine eucalyptus trees, from which were taken 15 gate posts for use of the signal corps at Fort Shafter.

During September laborers working under the direction and at the expense of the Trail and Mountain Club and Mr. W. R. Castle have repaired in a satisfactory manner the so-called "Castle" trail along the slope of Pauoa Valley from the hogback on Tantalus to Pauoa flat and the Konaheanui ridge; the so-called "Cooke" trail from the Nuuanu dam to Pauoa flat; and done some work on the Olympus trail as far as the Manoa-Palolo ridge. The Trail and Mountain Club has arranged to continue the work by the construction on this latter section of the necessary side and cross drainage ditches, which were not made when the trail was first built, several years ago. With one exception no further slides have taken place along this trail. The places where slips did occur soon after the trail was built are slowly beginning to be covered by vegetation.

In regard to the planting of koa and kukui in the Makiki basin on the slopes of Sugar Loaf, substantial progress has been made during the month in making ready for the actual setting out of the little trees, which will commence with the coming of the winter rains. Mr. Haugh's report gives the details of this work.

## FOREST FIRE NOTES.

I am informed by Mr. C. C. Conradt, district fire warden for East Molokai, that the two men who started the fire on the land of Wailua, Molokai, on July 23, 1913, pleaded guilty when brought to trial and were fined \$25 each. A few such convictions ought to have a salutary influence in causing the forest fire law to be respected. No forest fires have been reported the past month.

Very respectfully,

RALPH S. HOSMER,  
Superintendent of Forestry.

## REPORT OF FOREST NURSERYMAN.

Honolulu, September 29, 1913.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir:—I herewith submit my report for the month of September, 1913:

*Nursery—Distribution of Plants.*

	In Seed Boxes.	In Boxes Transplanted.	Pot Grown.	Total.
Sold . . . . .	2,000	200	680	2,880
Gratis . . . . .	4,000	200	837	5,037
	6,000	400	1,517	7,917

*Collections.*

Collections on account of plants sold amounted to . . . . .	\$ 6.60
Rent of building, Nursery grounds, for month of August . .	35.00
Total . . . . .	\$41.60

*Plantation Companies and Other Corporations.*

The distribution for the month under this heading amounted to 10,000 seedlings.

*Experimental Garden, Makiki.*

The principal work at this station has been transplanting seedlings, potting plants, mixing and sterilizing soil and doing other routine work.

*Honolulu Watershed Planting.*

The trail from the Makiki station to the new nursery on the ridge below Sugar Loaf has been widened so that pack animals and people desiring to ride that way can do so with ease. A tool and potting shed has been built, also six 50-gallon barrels installed for collecting water for the young seedlings. A commencement has been made to transplant the koa seedlings into tin cans. The work of making holes for the trees is also well started and a number are already dug. When the weather becomes suitable the 1000 koa trees at Makiki station will be planted on the face of Sugar Loaf, where we are at present getting the holes ready. Some five or six thousand more koa seedlings will be transplanted into tin cans and cared for at the new nursery on the ridge until they are ready to be planted out.

*U. S. Experiment Planting, Nuuanu.*

The man has been attending to the trees in the nursery and hoeing the smaller trees recently planted out.

Very respectfully,

DAVID HAUGHS,  
Forest Nurseryman.

*IMPORTANT ADDITIONS TO THE HAWAIIAN  
FOREST RESERVE SYSTEM.*

On October 13, 1913, Hon. E. A. Mott-Smith, Acting Governor of Hawaii, signed proclamations creating four additional forest reserves on the islands of Hawaii and Oahu. The list is as follows:

Kohala Mountain—North and South Kohala and Hamakua, Hawaii.

Upper Waiakea—Hilo, Hawaii.

Upper Oiaa—Puna, Hawaii.

Honolulu Watershed—Honolulu, Oahu.

The Kohala Mountain forest reserve takes in the summit and upper slopes of Kohala Mountain. It covers a total area of 29,627 acres, of which 14,204 acres is land belonging to the Territory. In that Kohala Mountain is one of the important catchment areas on the Island of Hawaii, from which water is led out in the Kohala and Hamakua ditch systems, the protection of the forest cover on the head waters of the streams tapped is a matter of much moment. Kohala Mountain was one of the first localities proposed to be reserved when the forest reserve system was inaugurated in Hawaii ten years ago, but owing to a combination



of unfavorable circumstances its actual reservation has again and again been delayed. Fortunately, however, the forest itself has not suffered in consequence, for through the construction of fences on the mountain, built voluntarily by the owners or lessees of adjoining land, or under the requirements of leases, cattle have been excluded and the forest cover maintained in good condition. Besides the summit of the mountain, which is mainly in government ownership, the Kohala Mountain forest reserve also embraces the private reserves at either end of the mountain that have for many years now been maintained respectively by the Pacific Sugar Co. above Kukuiahae, and by the several Kohala sugar plantation companies in the section above their cane fields. Under recently made land leases the forest fences bordering the forest on government land will be repaired and maintained.

The Upper Waiakea and Upper Olaa forest reserves together form a continuous block of forest on the lower slopes of Mauna Loa above the agricultural land lying back of Hilo town. The areas of these tracts, which are wholly in government ownership, are respectively 51,800 acres and 9280 acres. There is no running water coming from this forest, but, as pointed out by the Superintendent of Forestry in his report, it is for the interest of the people of Hawaii that such a body of forest as this be given the protection and proper administration which a forest reserve implies. On the Upper Waiakea forest reserve are land leases that have yet some years to run. Upon their expiration the full reservation of the area for forest purposes will take place automatically.

The Honolulu Watershed forest reserve, as its name implies, embraces the slopes of the main mountain range back of Honolulu, from Kalihi to Palolo Valley. It includes an area of 6950 acres, of which 5000 acres is government land. The object of this reserve is to protect the catchment area from which is drawn the city's water supply. Being set apart as a forest reserve, the upper portions of the land can be given better protection than if left merely as tracts of unleased government land; lower down, through coöperation with the water works department, better care can be given to making all the available sources of supply do their full duty.

At the public hearing on October 8, there was also considered a modification of the boundary of the Molokaa forest reserve on Kauai. In this case 83 acres were eliminated as not being essential to the reserve and of greater value for grazing, and 34 acres were added. Provision has recently been made so that the entire lower boundary of this reserve will soon be protected by a forest fence. When this fence is completed cattle will be shut out of the forest on the whole windward side of Kauai.

Following the usual custom, the reports of the Superintendent

of Forestry, setting forth the reasons for the reservation of the above described lands as forest reserves, are given herewith.

#### REPORTS OF THE SUPERINTENDENT OF FORESTRY.

##### *Kohala Mountain Forest Reserve.*

Honolulu, June 5, 1913.

Gentlemen:—In October, 1908, I submitted to the Board the recommendation that a forest reserve be set apart on Kohala Mountain in the districts of Kohala and Ilamakua, Ilawaii. [Published in the *Hawaiian Forester and Agriculturist* for December, 1909; Vol. VI, No. 12: pp. 472-478.] The project was referred back to me by the Board to have included in the proposed reserve an additional section of certain privately-owned land at the west end of the mountain, more particularly a portion of the tract known as Kehena 2.

Since then, as the members of the Board know, persistent efforts have been made to acquire the area in question for the government, that the whole section might be set apart and maintained strictly as a forest reserve. To this end a sum of money for the purchase of the forested part of Kehena 2 was raised among the Kohala district sugar plantation companies, and later condemnation proceedings were instituted by the government for acquiring this land.

Up to the present time these efforts have not been successful, nor is the outlook good that this addition will be made in the near future, as the special fund pledged by the Kohala plantations has recently been withdrawn.

On July 1, 1913, the existing leases expire on the large government land of Puukapu that embraces the greater part of the summit of Kohala Mountain, as well as on one or two other tracts that also run up into the proposed Kohala Mountain forest reserve. These lands are now held by the Parker Ranch. This ranch has for some years now maintained fences on the mountain bordering the forest. At the time the fences were being built the ranch got out the wild cattle then at large on that mountain.

The object of postponing the creation of the Kohala Mountain forest reserve was primarily to bring pressure to bear toward getting the whole forest area on the Kohala Mountain included in the reserve. In practice it has not worked out so, and especially now that action on Kehena 2 appears likely to be slow in coming to a head, it seems advisable not to wait longer before setting apart the remainder of the lands on Kohala Mountain. I therefore recommend that this project be taken up and disposed of. An addition to the area of the reserve can readily be made later, if Kehena should then be available.

The area now recommended to be reserved differs a little from

that suggested in my original report in that the reserve as now proposed includes the private forest reserves that have for ten years or more been maintained above the Niulii, Halawa and Kohala plantations in Kohala. The forest line back of Waimea has also been slightly modified, recent surveys having made available more accurate data than were to be had in 1908. Above the recently laid out Puukapu homestead lots, second series, the forest line has been somewhat changed in location, as by so doing it was possible to secure, as one of the terms of the lease of the remnant of government land adjoining, the building and maintenance of a substantial fence on the forest reserve boundary. No part of the lands of Kehena 2, Kahua 1 and 2, or Waika is included in the reserve as now proposed.

The accompanying revised description, prepared by the Government Survey Office, gives the location of the boundary in detail. The total area of the Kohala Mountain forest reserve as now recommended is 29,627 acres. Of this 14,204 acres, 47.9 per cent., is land belonging to the Territory.

For the reasons set forth at length in my original report on this project, under the date of October 14, 1908, I now recommend that the Board approve the creation of the Kohala Mountain forest reserve and that the governor be requested to hold the necessary hearing and thereafter to set this area apart as a forest reserve, in accordance with law and custom.

Very respectfully,

RALPH S. HOSMER,  
Superintendent of Forestry.

*Upper Waiakea Forest Reserve.*

Honolulu, June 6, 1913.

Gentlemen:—I have the honor to submit as follows the recommendation that a forest reserve be created to cover the central forested portion of the government land of Waiakea, district of Hilo, island and county of Hawaii:

*Location, Object and Area.*

Waiakea is a large government land stretching from the sea at Hilo bay well up on the slopes of Mauna Loa. Much of the lower portion is in cane; the extreme upper part is more or less open grazing land, crossed by lava flows. Between is a section of heavy forest. The present recommendation is that the forested portion be set apart as a forest reserve, with the objects (1) of bringing the land under the management of the department of the Territory especially equipped to care for it, so that (2) it may be wisely administered in any way not inconsistent with its maintenance as a forest that may in the future be deemed best.

Owing to the geological formation of the island of Hawaii there are no running streams south of the 1855 and 1881 lava flows that come down the side of Mauna Loa back of Hilo town on lands lying immediately to the north of Waiakea. It is quite possible that springs and water holes may later be discovered in the Waiakea forest, for at present almost nothing is known accurately about the interior of this tract; but there are no running streams coming from it.

The question of stream protection does not, therefore, figure on Waiakea, but there are other reasons why it is important that existing areas of forest should receive the care and protection of the government. Until many more scientific data than are now available have been collected, it is impossible to tell how far-reaching may be the influence exerted on the country immediately surrounding large bodies of continuous forest, but it is evident that such influence does exist and that it is beneficial. Particularly is this true in the tropics and sub-tropics.

Further, on Waiakea it may happen that in time the question may arise of devoting portions of this forest to commercial utilization. To safeguard the interests of the government in all these ways and to be ready for any sort of development that may come about, it is desirable that the Waiakea forest become the Waiakea forest reserve.

The area proposed to be set apart is 51,800 acres. Of this 600 acres is a part of the land of Piilhonua, a remnant mainly covered with lava, between the boundaries of the Hilo forest reserve and Waiakea. Piilhonua is now under lease No. 103 to Hon. John T. Baker, expiring on March 21, 1921.

At the present time all of the land of Waiakea is under an expiring 30-year lease to the Waiakea Mill Co. (No. 124) that runs out on June 1, 1918. No use is at present made of the forest. Beyond the general clause against waste, common to the leases of that time, the lessees are not obligated to protect the forest.

The forest on Waiakea is a practically unexplored region. It is a dense stand of the rain-forest type. Ohia-lehua is the pre-dominating tree. Along its lower side, where the forest is crossed by the Olaa flume, are numerous groups of loulu palms, growing in company with great tree ferns. And throughout, so far as the interior is known, there is a dense stand of the undergrowth characteristic of this type of Hawaiian forest.

#### *Boundaries.*

The upper and lower boundaries of the proposed Upper Waiakea forest reserve have been somewhat arbitrarily fixed by drawing lines across the land from known points on the outside boundaries, but it is believed that they serve the purpose at this time as well as if they had been run out on the ground. The makai line very nearly parallels the flume constructed to carry water

from upper Kaumanu to the Olaa plantation. The upper line leaves out of the reserve the area suitable for grazing above the native forest.

The elevation of the makai boundary is approximately 1800 feet; that of the mauka line varies from 5000 feet at Puu Kalani to 4500 feet at the 1855 lava flow, where the proposed reserve joins and forms a continuation of the existing Hilo forest reserve.

*Description.*

A technical description of the boundary, prepared by the Government Survey Office as C. S. F. 2430, accompanies this report.

*Recommendations.*

For the reasons above set forth I do now recommend that the Board approve this project and call upon the governor of the Territory to set apart this government land as a forest reserve to be known as the Upper Waiakea forest reserve.

Very respectfully,

RALPH S. HOSMER,  
Superintendent of Forestry.

*Upper Olaa Forest Reserve.*

Honolulu, June 18, 1913.

Gentlemen:—I have the honor to submit as follows, the recommendation that the remainder of the mauka portion of the government land of Olaa, to the north and west of the various subdivisions of homestead lots in the district of Puna, island and county of Hawaii, be set apart as a forest reserve. This land all belongs to the government. It is not now under lease. The area is 92.80 acres.

*Object.*

The reasons for the reservation of the Olaa forest remainder are largely the same that prompted me a short time since to recommend the reservation of the adjoining forest land of Waiakea, mauka (see report, dated June 6, 1913). Indeed, these two tracts, forming a continuous forest, are really to be considered together. They are only reported on separately because, for purposes of description, it was found desirable to treat them as two units rather than one.

No running water comes from the Upper Olaa forest. Its reservation as a forest reserve is justified, rather, because of the fact that the question may some time arise of exploiting its timber. It is none too soon to make provision against that time. One essential reason for setting the land apart now is that it may be brought under the care and control of the Territory's forest department.

Like Waiakea, the upper portion of Olaa bears a heavy stand of forest. Ohia-lehua is the predominating tree, but with it in mixture are many other species. On its western edge the Upper Olaa forest joins the Bishop Estate land of Keauhou, on which is a heavy stand of the tallest and largest koa in the Territory. A section of Keauhou some seven miles long by one mile in width has for 10 or 12 years been held by that estate as a private forest reserve.

The heavy koa forest does not extend much, if any, on to Olaa, but near the Keauhou boundary, on the government land, is a fine stand of large tree-ferns (*Cibotium*) of perhaps as large size as any to be found in the Territory. These give at least a botanical interest to this region.

Some five years ago ohia-lehua railroad ties were, for a time, cut on the McKenzie lots, one of the homestead subdivisions of upper Olaa. Other than this, except as certain areas of forest have been cleared on other adjoining homestead lands and sold as firewood, there has been no commercial development of the upper Olaa forest.

#### *Description.*

The official description of the proposed Upper Olaa forest reserve, prepared by the Government Survey Office as C. S. F. No. 2476, accompanies this report.

#### *Recommendation.*

For the reasons given above I do now recommend that the Board approve the setting apart of this tract as the Upper Olaa forest reserve, and that the governor be called upon to hold the hearing and thereafter to issue the proclamation incident thereto.

Very respectfully,

RALPH S. HOSMER,  
Superintendent of Forestry.

#### *Honolulu Watershed Forest Reserve.*

Honolulu, June 14, 1913.

Gentlemen:—I have the honor to submit, as follows, a report recommending the creation of a forest reserve on the mountain ranges back of Honolulu:

#### *Location and Area.*

The area proposed to be reserved covers the slopes of the Koolau range from Kalihi valley to Palolo valley inclusive, taking in the heads of the several valleys between. It also includes for purposes of administration the planted forest on Tantalus and the Makiki park. The total area is 6950 acres, of which 5000 acres, 72 per cent., is land belonging to the Territory. The proposed

boundary, together with other lines and an indication of the topography, is shown on the accompanying map, prepared by the Government Survey Office. I recommend that this reserve be called the Honolulu Watershed forest reserve.

### *Object.*

The object of the proposed Honolulu Watershed forest reserve is to protect the water sources, both surface and artesian, on which the city of Honolulu has to depend for its domestic supply. With rapidly increasing population the time is not far distant when every drop of water that can be developed in the vicinity of Honolulu will be needed. By the setting apart of this catchment area as a forest reserve, better control can be exercised over it and more effective measures taken to protect and preserve thereon the cover of native vegetation so necessary in Hawaii on a watershed that is to be made to do its full duty.

### *Present Sources of Supply.*

The more important of the present sources of Honolulu's supply are the springs and streams in Kalihi, Nuuanu, Paoua, Makiki, Manoa and Palolo valleys, and the artesian wells that are scattered from Diamond Head to Moanahua.

It is unnecessary here to go into detail as to how the streams are diverted. Sufficient to say that the water that flows from the mountains back of this city, either on the surface or in the artesian strata, is the natural, and unless water be brought from a considerable distance—as from valleys in the Koolau range—the only available source of supply. It follows, as has repeatedly and for many years been pointed out by many persons, that greater care should be given the Honolulu watershed. The setting apart of this area as a forest reserve is a step toward the adequate protection and conservation of this area.

Under Section 565 of the Revised Laws of Hawaii (a law based on one enacted in 1860), the superintendent of public works has the right to take and use for the Territory any land and water needed for water works purposes "on the southern and western slopes of the Konahuanni range \* \* \* between Palolo and Kalihi valleys." Under this law the upper part of Nuuanu valley has for many years been held as a water reserve, various pieces of private land having been acquired from time to time to round out the government holdings. The Makiki Valley water reserve was taken over by the government under the same law. It has been so held since 1881.

Of the other valleys Kalihi and Paoua are for the most part in private ownership. A fair percentage of the mountain slopes at the head of Manoa fortunately still vest in the government, and, since the recent acquisition of the area around and including the Palolo crater, the same can be said of Palolo valley. Altogether,

government land makes up 72 per cent. of the total area of the proposed reserve.

### *Tantalus Forest and Makiki Park.*

In addition to the valley heads and the slopes of the backbone ridge of the island, there have also been included in the proposed reserve the Tantalus forest and the Makiki park. The latter includes the Makiki water reserve. This park was set apart by a proclamation by the governor, issued in compliance with a request contained in House concurrent resolution No. 18 of the legislature of 1911. The upper part of the valley contains springs that form a part of the city's water supply. The slopes above them need to be guarded from contamination. Lower down a part of the valley is now the site of an experiment garden of the Division of Forestry, where plants of economic importance new to the Territory are started and propagated for distribution. The management of the Makiki park as regards forest work was officially turned over to the Board of Agriculture and Forestry by the superintendent of public works, in July, 1912, but this in no way affected the control or administration of the water works in that valley, any more than setting apart the proposed forest reserve will interfere with the operations of the bureau of water works in that valley or in Nuuanu.

The Tantalus forest, as all old residents of Honolulu know, was planted by the local government between the early 80's and 1898 at a very considerable outlay of time and money. A considerable portion of this forest was subsequently discovered to be on privately-owned land. In 1907, as a part of a land exchange, the Territory re-acquired possession of this tract, Kalawahine. The Tantalus forest has for several years now been looked after by the Board of Agriculture and Forestry, although still vesting in the Land Office. One reason for including it in the proposed forest reserve is that it may, without any question, be brought under the full jurisdiction of the Board of Agriculture and Forestry.

### *The Boundary.*

Starting on the Ewa ridge of Kalihi valley, the boundary of the proposed Honolulu Watershed forest reserve follows the makai line of two government tracts, a remnant and the land of Kaloaloa; thence it runs across the heads of two smaller gulches on the lands of Kamanaiki and Palama, past the head of Waolani valley above the Country Club, to and across Nuuanu valley on the makai line of the main Nuuanu Valley water reserve and up the east wall of Nuuanu to the Pacific Heights ridge on the line between the government and the grazing land owned by the Dowsett Company. Then makai, along the ridge, toward Pacific Heights to a point opposite the west mauka corner of the land of Kalawahine, across Pauoa to the same, and makai along the



boundary of Kalawahine to the main Tantalus road across the forest and along the same and the upper boundary of the Makiki homestead lots; thence on the makai boundary of the Makiki park around the Makiki valley to the summit of Sugar Loaf and down the slope into Manoa; thence around Manoa valley at the base of the steep pali and following the boundary of the government land at the head of the valley to the Palolo ridge; down the same to the makai side of a small piece of government forest called Pukele, and thence across Palolo valley on the mauka boundary of Wailupe and of lot 13 of the Palolo homesteads. Returning, the proposed boundary follows up the Waiomao-Waiālae ridge to the backbone ridge of the island and then west along it to the lateral ridge separating Kalihi and Kahaniki, down which it runs to the point of beginning.

Considerable private land is included in this reserve, some of it unavoidably, some purposely, as in Palolo valley, where it was thought best to make the limits of the reserve take in certain possible reservoir sites that it may some time be advisable for the city to develop. As with other Hawaiian forest reserves, the fact that these private lands are included within the boundary is to be taken merely as a recommendation as to the line which this Board thinks ought to be the permanent boundary of the forest. Only the land owned by the government, of course, can actually be set apart.

Accompanying this report is the technical description of boundary prepared by the Government Survey Office as C. S. F. No. 2429.

#### *Recommendation.*

For the reasons above set forth I do now recommend that the Board approve this project and request the governor to create the Honolulu forest reserve and to set apart in accordance with law and custom, as portions thereof, the government lands within its boundary.

Very respectfully,

RALPH S. HOSMER,  
Superintendent of Forestry.

*Modification of Boundary, Moloaa Forest Reserve, Kauai.*

Honolulu, June 16, 1913.

Gentlemen:—I have to recommend a change of boundary in the Moloaa forest reserve, Kauai, more particularly in that portion which lies in what is now known as the district of Kawaihau. The change will result in the elimination of 83 acres of open land and the reduction of the total area of the reserve from 5670 acres to 5587 acres. Seventy-one acres is government land; the re-

mainder is in private ownership. The section in question lies between a prominent spur just to the west of the old Lindsay place and the Kaluaa stream. The old and the new forest lines are shown on the accompanying blueprint.

#### *Reasons for the Change.*

When the Moloaa forest reserve was laid out, in running the forest line between fixed points there was included within its limits some 80 acres of grazing land. With the exception of one small grove of trees and some pali, this area is open grass land, of more value for grazing than for forest, especially in view of the growing demand for pasturage on Kauai.

As it is not strictly needed as a part of the forest reserve, my judgment is that the area should be taken out and leased.

When on Kauai during the summer of 1912 I went over the land with the idea of this modification in mind. Last month I again visited Moloaa and with the assistance of Mr. S. W. Tay of the Government Survey Office changed the location of the line on the ground. By moving one forest reserve monument up the ridge 800 feet, the line is shifted sufficiently to exclude the grazing area.

#### *Fencing.*

The remainder of government land lying below the forest reserve was leased in October, 1912, to Mr. C. A. Rice. One of the provisions of the lease is that a fence shall be built on the forest line within a year. It is partly in order to make provision for having this fence properly located on the permanent forest boundary that the change of location is brought up at this time. With other arrangements now pending, it is expected that practically all of the remainder of the lower boundary of the Moloaa forest reserve will be fenced in the near future. It is highly desirable that this work be done, for trespass by cattle has been going on at Moloaa for a long time, much to the detriment of the mantle of vegetation on the slopes.

#### *Description.*

Owing to changes of name and boundary in the geographic districts on Kauai, the Survey Office has prepared a revised description of the whole line of the Moloaa forest reserve. This description, C. S. F. No. 2431, accompanies this report.

#### *Recommendation.*

For the reasons, then, that the area proposed to be excluded appears properly to be grazing rather than forest land; that it can be spared from the reserve; and that the adjustment of the line will facilitate the construction of a permanent forest fence, I do now recommend that the Board approve the proposed modification of boundary and call upon the governor to make the required change, as provided by law.

[While this project was being considered in committee it appeared desirable to make a further slight modification of the boundary. This matter was covered by a supplementary report, the essential paragraphs of which are as follows:]

*Supplementary Report on Moloaa Forest Reserve.*

Honolulu, August 30, 1913.

Gentlemen:—Under the date of June 16, 1913, I submitted a report recommending a change of boundary in the Moloaa forest reserve, Kauai, and desire now, before the matter is acted on by the committee on forestry, to suggest a further slight change in that reserve whereby there would be added a remnant of about 40 acres, the long narrow triangle of government land lying to the south of grant No. 549 to Ed. Rouxel, between the old Lindsay place and Aliomanu gulch.

It was expected at first that this area would be included in the grazing lease to Mr. C. A. Rice, but as it was not continuous with the remainder of his leasehold he did not take it.

The reasons for including it in the forest reserve are that as a detached remnant this small area is of practically no use to the government for grazing; that it is the same character as the land just above, and more particularly because a fence can be built on its lower or makai edge much more easily than on its upper side, the present forest boundary. A rocky section at best, it has been found on closer examination of the ground by Mr. Rice, a prospective bidder on the proposed fencing work, that the cost of post-hole digging would be materially less on the lower line. Mr. Tucker, the land commissioner, has no objection to the inclusion of this remnant in the reserve. I recommend that it be taken in.

Very respectfully,

RALPH S. HOSMER,  
Superintendent of Forestry.

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More than 3000 small logging operators now buy national forest timber; at least 25,000 persons, settlers, miners, stockmen and others obtain timber from Uncle Sam's big woodlot for their own use free of charge.

The forests of Corsica, the little island upon which Napoleon was born, are managed by the French government. They produce lumber, firewood and turpentine, and all parts of the tree are far more closely utilized than in America.

Two million trees will be planted on the national forests in Utah, Nevada, and southern Idaho during 1914.

## DIVISION OF HYDROGRAPHY.

October 3, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—The following report of operations of the Division of Hydrography for the month of September, 1913, is submitted:

## DROUGHT.

Data received from all islands except Hawaii show practically all streams to have the lowest discharge recorded since the inauguration of the hydrographic work. On Oahu the city water supply has reached a low point that will necessitate further restrictions in the use of water unless considerable rainfall occurs within the next few days. All streams on Oahu are at minimum discharges except in the case of the Waiahole stream, the discharge of which has been steadily increased by the underground water developed by the Waiahole tunnel. The north and south branches of the Kāukōnahua, which supply Schofield Barracks and the Wahiawa Water Company's reservoir respectively, have dropped below all known or estimated records. A measurement of the south fork on September 24 showed a discharge of but .74 of a million gallons per day, while on October 1 the north fork discharge totaled .96 million gallons per day.

On Maui the ditches of both East and West Maui are below all known records, while on Kauai the same condition occurs in a lesser percentage of ditches. Insufficient rainfall data have been received to make a comparison of the rainfall and run-off at this time.

## METHODS OF INVESTIGATION.

There are two methods, or plans, of procedure under which the hydrographic investigation of this Territory may be carried forward with the funds available. One method consists in covering a large amount of territory with a meager or limited amount of work and equipment. The second method is to concentrate equipment and operations at those localities in which the work seems most immediately needed and, as soon as the necessary equipment has been established and the investigation put in as nearly a self-operating basis as possible, then to take up the work at other localities in the order of its importance in relation to the utilization, operation and development of water usage.

Previous to August, 1912, the first-named method was adopted by the engineers in charge of this work. An effort was made to obtain at least a little information of a general nature relative to all perennial streams, ditches, pumping plants, rainfall, etc., on

the islands of Kauai, Oahu, Maui and Hawaii. Considering the limited funds available, a remarkable amount of data of a general nature was collected and has been published in Water Supply Paper No. 318 of the U. S. Geological Survey. While the data published furnish a considerable amount of general information relative to the water supply of the Territory, it does not go far enough to be of high engineering and economic value to those interested in the actual utilization of the sources of supply of irrigation, power and other hydraulic projects.

The economic utilization of Hawaii's natural water supply is one of the most important factors in the agriculture of the Territory, and one which calls for intense methods of investigation instead of the superficial or general methods adopted in the past. The investigation of every perennial stream, spring, or other source of water supply should include the following:

1. At least 15 years' continuous gauge height records. These records should be obtained by automatic registers which give a continuous record and which cannot make a mistake or falsify records, as is frequently the case in man-read and recorded gauge heights.

2. Sufficient measurements by weir or current meter to develop and maintain rating tables of discharge which may be applied to the recorded gauge heights, and which will give the mean or average discharge for every day in the year, as well as the maximum flood discharge and the minimum discharge.

3. Sufficient rainfall stations in the catchment areas of the streams to enable the relation of the rainfall to run-off to be worked out, if possible.

4. A careful study of the topographic and geologic features, the vegetation, forestation and erosive features of the catchment area in reference to possible cooperative work with forestry or other conservation procedure.

5. An examination and investigation of all diversions from the stream and its present utilization.

6. An investigation covering the possible utilization of any waste water, flood or otherwise, which might be economically utilized by diversion or storage.

7. An investigation of evaporation losses and of the amount of water utilized in plant transpiration and growth, or of, as it is commonly known, the water duty for various crops under various conditions of soil, location, etc.

The first four operations are the only ones which strictly apply to hydrographic investigation work, but as the hydrographic survey is a necessary preliminary step toward the last three investigations named, the two phases of the work should be kept in view and should be considered in conjunction.

The first step necessary for this work is the installation of the

proper gauge height recording equipment, as on this part of the investigation depend all further steps.

Acts 56 and 57 of the 1913 legislature have made the intensive study of streams and other sources of water supply in limited areas possible, and it is believed that this method of procedure should be followed in the future. This method has been inaugurated in parts of the islands of Kauai, Oahu and Maui, and by December 31, 1913, twelve of the largest sources of supply on Kauai, six on Oahu and sixteen of the largest streams on Maui will be equipped with automatic registers, and will be ready for further steps of the investigating work. In selecting these streams those which are of the greatest economic value, or which may be utilized to supply water where crops are now suffering for lack of it, have been given preference. Should the present supply of funds continue to be available, it is estimated that within eight years all sources of supply will be under investigation; installation and construction work will be completed, and funds will be available to take up the features of investigations relative to utilization and duty. Pending the installation of clock register gauges, the practice of obtaining staff gauge readings by observers will be continued on those streams that are now under observation.

#### HYDROGRAPHIC RECORDS AND DATA.

From past experience it has been found best to work up records and data of perennial streams in annual units, and to publish these records and data for periods covering calendar years. Special investigations of seepage losses, reconnaissances for small domestic or power investigations, etc., may be made and completed within a shorter period of time, but investigations of perennial streams of sufficient importance to be considered in connection with a general hydrographic investigation are best reported annually. For this reason monthly reports from this division are necessarily of a routine nature, and it is much more difficult to convey information regarding the results to be obtained and the ends being worked for, than in the case of other phases of governmental work.

The following is a brief report of operations on the islands of Kauai, Oahu and Maui:

##### *Kauai.*

Mr. Hardy, assisted by Mr. Horner, visited 30 stream-gauging stations and 21 rain gauges, and made two measurements. Four gauging stations were discontinued on the Kekaha, Waima and Poowaiomahaihai ditches as having served their purpose. About twelve miles of trail in the Lumahai, Hanalei, Wainiha and Kalihiwai valleys were constructed to reach suitable locations for the new Stevens clock registers which are to be installed in October.

*Oahu.*

On Oahu Mr. Dort and Mr. White visited 37 stream-gauging stations and four rain-gauging stations. Twenty-two regular stream measurements and one miscellaneous measurement were made. The new Kalihi clock register station was complemented by a footbridge for flood measurements. On September 12 a measurement was made of the water developed in the north portal of the Waiahole Water Company tunnel which showed a discharge of 20.6 million gallons per 24 hours.

*Maui.*

Mr. Bailey and Mr. Christiansen visited 48 stream-gauging stations, and made three measurements at regular stream-gauging stations and two miscellaneous measurements. During the month four new clock register stations were completed on the Kailua, Nailiilihale, Waikamoi and Ilaipuaena streams on East Maui. An inspection and reconnaissance trip was made by Mr. Larrison and Mr. Bailey from Kailua around East Maui, via Hana, Kipahulu, Kaupo and Haleakala to investigate water conditions. Future station sites on all streams east of Keanae and between Hana and Kaupo were tentatively selected. It is believed that about 20 million gallons of water per day are now running to waste in dry weather between Hana and Kaupo, which could be utilized at Hana, Kipahulu and Kaupo at reasonable construction and maintenance costs. A small part of this water is now being used by the Kipahulu mill and for fluming purposes.

Ten ditch-gauging stations were discontinued during the month.

*Kona Investigation, Hawaii.*

Mr. Kimble, assisted by Mr. Wassman, has completed all possible storage sites but three in North Kona, and has completed a clock register weir station on the Kiilae stream in South Kona. Mr. Kimble reports that all field work, including the population and present water supply census, will be completed in November, leaving but routine rain-gauge reading and clock-register reading to be done.

Very respectfully,

G. K. LARRISON,  
Superintendent of Hydrography.

Ammonia bombs are being tried out on some of the national forests for the purpose of extinguishing forest fires. They are said to have worked well in the case of brush fires where the fire-fighters find difficulty in getting near enough to the burning area to beat out the flames. Each bomb exploded will extinguish fire in a circle of about five yards in diameter.

Switzerland has four coöperative associations for the growing and marketing of forest products.

## THE KALO IN HAWAII (II').

By VAUGHAN MACCAUGHEY and JOSEPH S. EMERSON.

## VARIETIES (Continued).

52. *HIWA*. This name refers to the dark color of the plant and its suitability for offering to the gods. It is associated with *puna hiwa*. A cultivated kalo, never growing wild, raised in both irrigated and unirrigated fields. The corm is of average size, whitish within. The foliage is very dark green, with a grayish or blackish suffusion. The *poi* and *lua'u* are good; the plant is suitable for medicinal purposes. According to some natives this variety is called *Hiwa* on Hawaii, and *Uhi-a-Pele* on Oahu and Maui.

53. *HOENE*. This word means a syringe, and is applied to this kalo because shaped pieces of its hard and slippery corm were used medicinally as suppositories. It was cultivated extensively, in unirrigated fields, for its medicinal uses, and was never used for food. Much was formerly raised in Palama, Oahu. The corm is dark colored; the foliage has no distinctive markings.

54. *HOKEO*.

55. *HOOLE NAWAO*. "Wao" means in the wild, or near the forest; "*hoole*" means denial; and the name refers to an ancient legend, wherein certain natives denied that this kalo grew up in the forests, although it really did. Usually wild, rarely cultivated; if so, in *lo'i*. Cultivated formerly in Manoa, Oahu; grows wild on Maui and Hawaii. The corm is dark gray within, and of average size. According to the natives the wild corms are much larger than those of cultivated plants. The roots of the corm are conspicuously reddish. This variety, like certain others, sends out subterranean suckers or offshoots, so that it spreads out and thus perpetuates itself. The foliage is green, with reddish or purplish venation, *piko*, and petioles. The *lua'u* is excellent; the plant is not considered suitable for medicine, or for offering to the gods.

56. *HUALANI*.

57. *HUA MOA*.

58. *HULI PU LOA*. A kalo known in Kohala, Hawaii.

59. *IAMA ILIA*. Probably a synonym for *Ieiheile* q. v.

60. *IEIE*. The foliage of this kalo is dark green and glossy, somewhat resembling that of the *ieie vine*. This variety is sometimes erroneously called *Kumu ulaula*. It is a cultivated kalo, raised in unirrigated patches near the edges of the woodlands. Raised extensively on Hawaii. The petioles are very dark purplish, more so than other varieties.

61. *IEIHEILE*. A Hawaiian kalo, grown both in *lo'i* and



unirrigated patches, not raised on Oahu. The foliage is of the usual clear green color; the corm is somewhat pinkish within.

62. II. So-called because of a fanciful resemblance to the fern *pala u* (q. v.) *Pala* means luscious or fully mature, and this variety is so called because its corms are unusually palatable.



HARVESTED FIELD, HULI

Note the solid stone embankment, the empty field, the *huli* cut for planting.

It is cultivated, never growing wild. Raised in 10's and unirrigated fields, on Hawaii and Oahu. The leaves are dark green; when the plant grows rankly, the petioles are said to attain a height greater than of a man. The leaf-blade greatly resembles that of the *Apuwai*. The corm is of average size, light gray within, and prized because of its suitableness for making the pud-

dling *kulolo*, because of its non-acridity. The corms command a much higher price than those of other varieties, because of their scarcity and choice quality. The plant is suitable for all purposes, save as offering to the gods.

63. IPUOLONO. "The cup of Lono," the sacred cup. According to some authorities this name is given to it only on Oahu, and on Hawaii it is called *W'ehiwa* or *W'e wehiwa*. There are two sub-varieties, *keokeo* and *ulaula*.

64. IPUOLONO KEOKEO. A common variety, cultivated in *lo'i* and unirrigated fields, not occurring wild. Typical localities are Paoa, Oahu, and Kohala and Kau, Hawaii. The corm is gray within; sometimes attains large size, although usually small. It matures in one year, and can remain in the ground for a much longer time without deterioration. The Chinese planters pull it in from nine to eleven months, which is too soon. The leaf is dark green, and somewhat curved, like a cabbage leaf, so that it catches rain. This *kalo* is suitable for all purposes.

65. IPUOLONO ULAULA. Similar to the above, except that the corm is pinkish or reddish, instead of gray.

66. KA'I. A well-known *kalo*; also called *W'elo-welola* and *Ala* (q. v.). The latter name is applied when the *kalo* is cooked in an oven, and emits pleasant odors. There are several sub-varieties.

67. KAI AWEUWEU. See *Aweoweo*.

68. KAI ELEELE. Similar in all respects to *Kai kea*, except that the corm when cooked is dark gray (*eleele*) instead of light yellowish (*mele mele*).

69. KAI KEA. Raised in unirrigated fields on Hawaii, in *lo'i* on Oahu and Kauai. The corm is yellowish, translucent, or amber-like (*melemele*); texture firm and tough. The foliage is clear green. The *poi* is very good, and was formerly much esteemed by the chiefs, because of its amber-like translucency. Its production has been abandoned since the Chinese occupancy of the *kalo* lands. This *kalo* requires 8-12 months for maturity.

70. KAI KEOKEO. Synonym for *Kai kea*.

71. KA-I KOR. By some natives this is considered synonymous with *Ka-i eleele*; according to others it is a distinct variety. It is a cultivated *kalo*, never occurring wild, and is grown in *lo'i* and in unirrigated fields. In olden times the Ewa region, on Oahu, was famed for the excellent *kalo* of this variety that it produced, and "*Ka kai o Ewa*" is still a current phrase. The raw corm is whitish within; upon cooking it turns dark gray. It is firm and close-textured, and requires much labor to pound. The foliage is dark green. The *poi* is excellent, is dark gray or light bluish when fresh, and becomes darker with age.

72. KAINELE UREU.

73. KALALAMA MAKAIH.

74. KALALAU.



KALO NEARLY MATURE.

The plants crowd one another as they mature, and the leaves form an almost unbroken canopy. Note bananas in upper left hand corner.

- 75. KALANI PILI.
- 76. KAMAU.
- 77. KANEIIL.
- 78. KANIO. The name refers to the spotted or variegated (*onio*) leaves. This kalo was formerly abundant; it is now practically extinct. The corn is light gray within; it matures in one year. The foliage is dark green mottled with purplish; the

petiole is striped with purplish. This variety is good for poi, for *lau'u* and for medicine.

79. KAPALILI.

80. KAPUUKONANE.

81. KAWALE UAUU.

82. KAWELO.

83. KOA'E. So called because it is striped or spotted; fancifully likened to the *Koa'e* bird (tropic bird). There are three sub-varieties—*keokeo*, *elele*, and *ulaula*.

84. KOA'E KEOKEO. A *kalo* cultivated in *lo'i*, formerly abundant, now rare. The corm is light gray within. The foliage is mottled, and the petiole is striped with purplish. Good for *poi* and *lua'u*; not used medicinally.

85. KOA'E ELELE. Similar to *Koa'e keokeo*, save that the leaf is very dark green, the petiole almost blackish.

86. KOA'E ULA ULA. Similar to *Koa'e keokeo*, save that the leaf blade and petiole are suffused with reddish.

87. KOHIKU.

88. KOOKA.

89. KUKAI IOLE. Name means "mouse dung." Raised in the Hilo region, Hawaii.

90. KUMAK'U. The natives tell a marvelous tale regarding this *kalo*. It is now extinct, but in ancient times was raised in certain *lo'i* at Pahaalele, near Waihee, Maui. The corms were cylindrical in shape and attained prodigious size, sometimes two feet thick and six feet long! They were edible, and were also used as rollers, in the process of launching canoes!

97. KUMU. This name was applied originally to a certain red fish, and was later given to this *kalo* because its corms were red in color like the fish. The *kalo* is well known, and there are numerous sub-varieties.

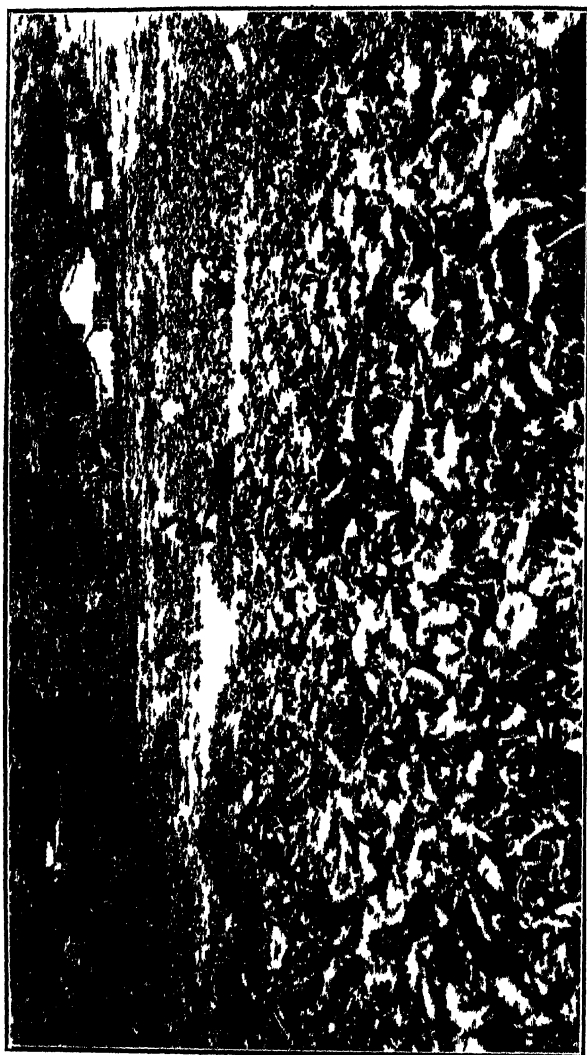
92. KUMU KEA, or KUMU KEOKEO. Similar to *Kumu ulaula* except that the foliage is clear green, not suffused with reddish.

93. KUMU PONI. Similar to *Kumu ulaula*, save that the foliage is very dark, the bases of the petioles being blackish.

94. KUMU ULAULA. Quite rare. The corms are large, and decidedly red within. The foliage suffused with reddish. The *poi* is very choice and is superior to *Piialii* in color. Both the fish *Kumu* and this *kalo* were considered very suitable for offering to the gods as propitiation for *heva* (non-fulfillment of vows). In 1908 Mr. L. C. Lyman of Hilo sent corms of this *kalo* to the U. S. Department of Agriculture.

95. KUMU WELOWELOLA. Probably another name for *Kumu ulaula*. So called because it grows best, in native belief, when planted at sunset time, on a day when the western sky is red. If this precaution is observed, the corms upon maturity will be of the desired red color.

96. KUONIO.



#### MATURE KALO—HARVESTING

This land is leased and operated by Japanese and Chinese. Note the terraced fields; the workmen pulling the corms; the piles of corms upon the banks, the kalo leaves and other debris floating on the shallow water; the valley side; the Chinese white washed cottages

- 97. KUPALA.
- 98. LAI O KONA.
- 99. LAPA.
- 100. LAUAPE. Means "leaf like the ape."
- 101. LAUKAPALILI.
- 102. LAUKONA.
- 103. LAULELE.

104. LAULOĀ. A well-known kalo. Name means large or long leaf. Several sub-varieties.

105. LAULOĀ HAELELE. Raised in *lo'i* and unirrigated fields. When grown in unirrigated patches, as on Hawaii, the petioles are not striped and it is then called *Palakea*. On Oahu it is grown commonly in *lo'i*. The corm is white within. This kalo is considered suitable for medicine, and for offering to the gods.

106. LAULOĀ HAKEOKEO. Also called *Lauloakeokeo*.

107. LAULOĀ HAULIULI. The corm is light colored when raw, but upon cooking becomes dark-colored and beautifully mealy. It is very suitable for baking or frying.

108. LAULOĀ MANINI. According to native tradition this kalo is not at all suitable for presentation to the gods (*au makua*) because it is associated with the idea of death, and anything having these associations is not suitable.

109. LAULOĀ ONONIO. A *lo'i kalo*, with white corm and striped petioles. The *poi* is good, and resembles that of *Alpuwai*. It is soft and easily pounded, but not mushy, and not hard like that of *Ka'i*. This kalo matures in one year.

110. LAULOĀ ULĀULĀ. The corms of this *lauĀo* are distinctly pinkish within.

111. LAU NUI. Means "large leaf." Varietal name in use on Oahu.

112. LEHUA. A well-known kalo (grown throughout the Islands, and divided into numerous sub-varieties. Mr. F. A. Clowes of Hilo sent corms to the U. S. Department of Agriculture, February, 1911, and wrote as follows: "The term 'Royal Taro' should, I believe, be applied to a class of taros and not to any one variety. All the dark-fleshed taros were, I am told, taboo to the common people, and were only eaten by and grown for the chiefs. The Lehuas, of which there are two, the black or Eleele, and the white or Keokeo, are only two of this class." (Bur. Plant Ind. Bull. 233, p. 38.)

113. LEHUA AOLA. A sub-varietal name known on Oahu.

114. LEHUA ELELE. "Royal Black Taro." "The distinctive mark of this Lehua is the dark purple ring at the junction of the corm and the leaf-stalk" (Clowes).

115. LEHUA HAULIULI.

116. LEHUA KEOKEO. "Royal White Taro." The uncooked corm is purple, apparently non-acrid; upon cooking it turns pink. The sprouts from the corm are also purple. The corms mature in about eight months.

117. LEHUA KUIKAWAO. This name refers to its habits of growing wild in swampy places near the forest. It is also cultivated in *lo'i*, and was formerly abundant in Hilo, Honohulu and other places. The corms are red, like those of *Piialii*. The foliage is suffused with reddish; the petioles frequently attain the length of three feet. The *poi* and *lua'u* are excellent.

118. LEHUA ONIONIO. Corm and poi similar to *Piialii*. The foliage also resembles that of *Piialii*, save that the leaf-blade of *Piialii* is curled or wavy along the margin, while that of *lehua ulaula* is open and expanded, without waviness.

120. LELE.

121. LEO.

122. LILI LILI MOLENA ELEELE.

123. LILI LILI MOLENA KEOKEO.

124. LIKO LEIUA.

125. LILI LEIUA.

126. LOHA.

127. LOLA. So called because of the wrinkled leaf-blade. Cultivated both in *lo'i* and unirrigated field; formerly abundant, but now uncommon. The corm is dark red or purplish within. The leaf-blades are spotted with purplish, and the petioles are striped with the same color. The petioles are often very long (4-5 feet), and are probably the longest of any Hawaiian *kalo*. The *poi* and *lua'u* are excellent; the plant is not used medicinally.

128. MAHAHA. A wild *kalo*, growing in wet places near the edge of the woods; never cultivated in *lo'i*. There are two sub-varieties.

129. MAHAHA KEOKEO. By some natives considered synonymous with *the* (q. v.). The corm is white within; the *poi* is of very poor quality; in fact, the adjective *mahaha* is applied to *kalo* that is hard and unfit for poi-making (*loli-loli*). The petioles are reddish or purple. The *lua'u* is excellent.

130. MAHAHA ULAULA. Similar to *Mahana keokeo* save that the corm is pink within.

131. MAHAL. Synonym for *Mana*, q. v.

132. MAHAKEO. One of the *kalo* used in the preparation of native medicines.

133. MAHI.

134. MAKAOLE. Varietal name used on Oahu. Means "mouse eye."

135. MAKAOPIO. Cultivated on Hawaii, Maui and Oahu; both wet and dry land; never wild. The corm is reddish without; its interior is gray. The leaf is dark green, the petiole very dark purple. The *lua'u* is good; the corm is excellent steamed, and as *poi*. This *kalo* is similar to *Ha'okea*.

136. MAKAU. Varietal name used on Hawaii, in the Hilo region.

137. MAKEA.

138. *Makohi*. Varietal name, synonymous with *Mokohi* q. v.

139. MAKOKO.

140. MAKOLE.

141. MAKUKU (Kalo o Mahuku). A *kalo* famous at Nahiku, Maui, in olden times, and said to have been used for rollers for canoes.

142. MANANE. Varietal name used on Oahu.
143. MAMANU. Varietal name used on Oahu.
144. MANAUEA. See *Aweoweo*.
145. MANA. A large and well-known group of kalo varieties, as follows:
  146. MANA ELELE.
  147. MANA HAULAULA. See *Alla*.
  148. MANA HUA.
  149. MANA IEA.
  150. MANA KEA.
  151. MANA PIPIKA.
  152. MANA ULAULA. The petioles of this kalo are decidedly reddish. The interior of the corm is white; upon cooking it becomes bright yellow.
  153. MANAULAI.
  154. MANA WAI. Resembles *Apuwai*. Corm is white.
  155. MANA WEA. A wild kalo, growing in the mountains. Perhaps a synonym for *Aweoweo*.

Contrary to popular belief, forest fires seldom travel more than two or three miles an hour. Even in extreme cases it is questionable whether they burn at a rate of more than six to ten miles an hour.

Uncle Sam's forest rangers require that permanent camp sites within the forests shall be kept in sanitary condition. The ubiquitous tin can must be buried, and waste paper burned when a camp is left.

Makers of small hickory handles for hammers, chisels, and the like, are now trying to use the waste from mills which make hickory spokes and pick and ax handles.

Four new state forests have recently been added to those in Hawaii, making 27 in all, with an aggregate of 683,101 acres. Of this amount, 67 per cent. belongs to the territory, the rest being private land administered by the territorial forest officers.--Forest Notes for September.

At the national conservation congress to be held in Washington, November 18-20, the subject of forestry will be handled by a main committee, with subcommittees which will report on federal and state forest policies, forest taxation, fires, lumbering, planting, utilization, forest schools and scientific forest investigations.

Over twelve thousand dollars, ten per cent. of national forest receipts in Wyoming during the past fiscal year, is available for expenditure by the secretary of agriculture on roads and trails within the state, according to the report of the U. S. forest service.



## FOREST INSECT RAVAGES STOPPED.

By a prompt campaign against a flourishing colony of bark beetles on the Ochoco national forest in central Oregon, the government is eliminating a danger which threatened to destroy millions of feet of timber.

Some authorities claim that the amount of timber killed each year by insects is equaled only by the annual loss from forest fires. Among the most destructive of these insect enemies are the bark beetles, one of which, the mountain pine beetle, is responsible for most of the damage on the Ochoco forest. This deadly little beetle is less than a quarter of an inch in length, but bears the ponderous scientific name of *Dendroctonus monticolae* Hopk., which, being interpreted, signifies killer of the mountain pine tree, discovered by Hopkins.

Its methods of operation are interesting. The mature beetle bores through the bark of the tree and excavates a gallery in the inner living bark and in the outer surface of the wood in which it lays its eggs. When hatched each young larva, or beetle-grub, channels into this growing portion of the trunk, feeding upon the inner bark. When full grown the larva, after passing through a dormant, or pupal, stage becomes a beetle. This beetle then drills out through the bark in July, and, emerging into the world, seeks a fresh tree and starts a new generation. With this "chain-letter" method, it soon infests a large area. The galleries or channels of the larvae girdle the tree and kill it, and the beetle's presence is usually discovered, as it was in the Ochoco forest, by a patch of red-brown dead pine trees in the midst of a mountain-side of green.

In fighting this forest scourge, the method recommended by the Bureau of Entomology is followed. The simple removal of the bark of infested trees between October and July, while the larvae are still in the tree, is sufficient to kill them. The lumber may then be sold while it is yet sound. On the Ochoco forest, however, there was no market, and the forest officers found that the cheaper and more effective method of control was to cut the trees and burn them before the new broods of beetles could emerge. In 1912 the infestation was given a decided check by the cutting of 3500 trees. This summer the attack on the insects was resumed with renewed vigor, and 42 laborers, in charge of a forest officer, cut more than 40,000 trees. As a result of these vigorous measures, the government apparently has the beetles under control.

## BY AUTHORITY.

## PROCLAMATION OF FOREST RESERVE IN THE DISTRICT OF HONOLULU, CITY AND COUNTY OF HONOLULU, ISLAND OF OAHU, TERRITORY OF HAWAII.

UNDER and by virtue of the authority vested in me by the provisions of Chapter 28 of the Revised Laws of Hawaii, as amended by Act 65 of the Session Laws of 1905, and by Act 4 of the Session Laws of 1907, and of every other power me hereunto enabling, I, ERNEST A. MOTT-SMITH, Acting Governor of Hawaii, with the approval of a majority of the Board of Commissioners of Agriculture and Forestry, having held the hearing of which notice has been duly given as in said Acts provided, do hereby RECOMMEND and APPROVE as a forest reserve to be called the HONOLULU WATERSHED FOREST RESERVE, those certain pieces of government and privately owned land in the District of Honolulu, City and County of Honolulu, Island of Oahu, Territory of Hawaii, which may be described roughly as embracing the catchment area between Kalihi and Palolo Valleys back of Honolulu, and containing an area of 6950 acres, more or less, more particularly described by and on maps made by the Government Survey Department of the Territory of Hawaii, which said maps are now on file in the said Survey Department, marked Government Survey Reg. Maps Nos. 2293 and 2554 and "Honolulu Watershed Forest Reserve," and a description accompanying the same, numbered C.S.F. No. 2429, which said description now on file in said Survey Department is as follows:

## HONOLULU WATERSHED FOREST RESERVE.

Including lands in the Palolo and Manoa Valleys, on the Makiki and Tantalus Heights, and in the Nuuanu and Kalihi Valleys, District of Honolulu, Island of Oahu.

(C.S.F. 2429.)

Beginning at a point at top of ridge between Waiamao and Waialae Nui, the coördinates of said point referred to Government Survey Trig. Station "Rocky Hollow" on the ridge between Waiamao and Kekio being 685.5 feet South and 2492.2 feet East, as shown on Government Survey Reg. Map No. 2293, and running by true azimuths:

1. 130° 00' 791.0 feet along Lot 12, Palolo Homesteads, to South corner of Lot 13;
2. Thence along and around Lot 13, Palolo Homesteads, by the following azimuths and distances:
  - (a) 218° 20' 128.0 feet to a rocky point on side of pali;
  - (b) 156° 20' 999.0 feet to XIII marked on large rock on edge of stream;
  - (c) Thence up along center of stream to + on rock in stream, the direct azimuth and distance being: 168° 05' 440.0 feet;
  - (d) 121° 10' 368.0 feet to top of ridge between Waiamao and Kekio;
3. Thence down ridge between Waiamao and Kekio along Lot 13, Palolo homesteads, the direct azimuth and distance being: 44° 30' 788.0 feet;
4. Thence still down ridge between Waiamao and Kekio along Lots 12, 11 and 10, Palolo Homesteads, to Government Survey Trig. Sta. "Rocky Hollow," the direct azimuth and distance being: 33° 30' 1077.0 feet;
5. 99° 56' 656.5 feet across small valley and along Lot 18, Palolo Homesteads to a spike in bed-rock of stream and waterfall;
6. 95° 12' 239.4 feet along Lot 18, Palolo Homesteads, to corner of fence;

7. 136° 06' 1048.5 feet along land of Waihupe to a + on rock;
8. 136° 06' 1320.0 feet along land of Waihupe to top of ridge dividing Manoa and Palolo Valley;
9. Thence 4300 feet, more or less, along said ridge along Grant 161 to Wm. H. Rice & Company's and Grant 152 to Punahou School to the East corner of said Grant 152 at a place called Keanapoe;
10. Thence 2000 feet, more or less, down Keanapoe ridge along Grant 152 to Southeast corner of Grant 3619 to Helen Boyd;
11. 192° 15' 850.0 feet across mouth of Wainekukua Valley and along Grant 3619;
12. 208° 30' 1010.0 feet along ridge along Grant 3619;
13. Thence 1000 feet, more or less, along ridge along Grant 116 to E. H. Rogers;
14. Thence 1600 feet, more or less, across Naniuapo Valley along Grant 116, L. C. A. 11029 and Grant 154 to E. H. Rogers to the top of Luualaea ridge;
15. Thence down Luualaea ridge to the Luualaea Stream;
16. Thence down Luualaea Stream to its junction with the Kahauiki Stream;
17. Thence 650 feet, more or less, across the land of Luualaea to a large rock marked + at the East corner of Grant 200 to C. Nawaina;
18. Thence 100 feet, more or less, up along Waihi Stream;
19. Thence 280 feet, more or less, up along Waihi Stream;
20. Thence 130 feet, more or less, up along Waihi Stream;
21. Thence 210 feet, more or less, up along land of Waihi;
22. Thence 200 feet, more or less, along land of Waihi;
23. Thence 1660 feet, more or less, along land of Waihi to foot of pali;
24. Thence along foot of pali across the lands of Aihualama and Haukulu, Grant 204 to Kanaa and Kahiwalani, the land of Puakaumaomao, Grants 80 to S. P. Kalama and 473 to E. H. Rogers and part of the land of Puahuula;
25. Thence up pali to the South corner of Waterhouse Lot; said corner being 880 feet, more or less, Southeast of Government Survey Trig. Station "Kakea";
26. 141° 05' 248.5 feet along Waterhouse Lot;
27. 124° 55' 229.0 feet along Waterhouse Lot;
28. 150° 15' 88.4 feet along Waterhouse Lot;
29. 221° 15' 100.0 feet along U. S. Military Reservation;
30. 130° 30' 173.0 feet along U. S. Military Reservation;
31. 104° 52' 239.6 feet along U. S. Military Reservation;
32. 70° 34' 214.9 feet along U. S. Military Reservation;
33. 351° 00' 185.5 feet along U. S. Military Reservation;
34. 27° 27' 1059.0 feet along ridge along Government land to a pipe;
35. 68° 21' 764.0 feet along Government land to a pipe;
36. 47° 47' 1249.0 feet along Government land to a pipe;
37. 40° 58' 1363.0 feet along Government land to a pipe;
38. 51° 27' 543.8 feet along Lot 825, Makiki-Round Top Lots, to road;
39. 149° 47' 104.3 feet across road to the North corner of Lot 817, Makiki-Round Top Lots;
40. 84° 49' 437.9 feet along Lot 817, Makiki-Round Top Lots;
41. Thence along 50 foot road on a curve to the left with a radius of 203.7 feet for a distance of 208.9 feet, the direct azimuth and distance being: 346° 22' 30" 190.85 feet to a stake;
42. 47° 00' 50.0 feet across road to a stake at the North corner of Lot 814, Makiki-Round Top Lots;
43. 92° 45' 179.4 feet along Lot 184, Makiki-Round Top Lots;
44. 101° 45' 50.0 feet across road;

45.  $11^{\circ} 45'$  73.9 feet along West side of road;
46. Thence along road on a curve to the right with a radius of 150.0 feet to a point, the direct azimuth and distance being  $21^{\circ} 16'$  148.5 feet;
47. Thence along road on a curve to the left with a radius of 350.0 feet to a point, the direct azimuth and distance being:  $12^{\circ} 27'$  220.2 feet;
48.  $354^{\circ} 07'$  185.0 feet along West side of road;
49. Thence along said road on a curve to the right with a radius of 40.0 feet to a point, the direct azimuth and distance being:  $37^{\circ} 30'$  55 feet, more or less;
50. Thence along road on a curve to the left with a radius of 136.0 feet to a point, the direct azimuth and distance being:  $50^{\circ} 10'$  145 feet, more or less;
51.  $17^{\circ} 20'$  171.0 feet along Makiki Street;
52. Thence along Makiki Street on a curve to the right with a radius of 518.06 feet, for a distance of 125 feet, more or less;
53. Thence on a curve to the right with a radius of 8 feet, more or less;
54.  $166^{\circ} 17'$  75 feet, more or less, along Makiki Drive;
55. Thence along Makiki Drive on a curve to the right with a radius of 462.0 feet, the direct azimuth and distance being:  $181^{\circ} 50'$  286.1 feet;
56.  $202^{\circ} 31'$  517.3 feet along Makiki Drive;
57.  $107^{\circ} 15'$  50.2 feet across Makiki Drive to a stake;
58.  $192^{\circ} 00'$  57.3 feet along Grant 5332 to F. K. Howard;
59.  $112^{\circ} 31'$  281.0 feet along Grant 5332 to F. K. Howard;
60. Thence on a curve to the right within a radius of 195.0 feet, the direct azimuth and distance being:  $78^{\circ} 05'$  116.1 feet;
61.  $182^{\circ} 56'$  50.0 feet across Makiki Drive;
62.  $92^{\circ} 56'$  101.6 feet along Makiki Drive;
63.  $88^{\circ} 42'$  101.8 feet along Makiki Drive;
64.  $87^{\circ} 19'$  38.0 feet along Makiki Drive;
65. Thence on a curve to the right with a radius of 20.0 feet, the direct azimuth and distance being:  $134^{\circ} 41'$  29.1 feet;
66.  $182^{\circ} 02'$  29.0 feet along Makiki Drive to the South corner of Lot 625, Makiki Heights Lots, the coördinates of said point referred to Government Survey Trig. Sta. "Makiki" being 179.6 feet South and 206.0 feet West;  
Thence along Makiki Heights Lots along edge of bluff;
67.  $211^{\circ} 35'$  241.9 feet along Lot 625;
68.  $240^{\circ} 00'$  60.0 feet along Lot 630;
69.  $215^{\circ} 00'$  181.9 feet along Lot 630;
70.  $176^{\circ} 53'$  226.4 feet along Lot 630;
71.  $192^{\circ} 51'$  312.0 feet along Lot 631;
72.  $198^{\circ} 08'$  198.2 feet along Lot 636;
73.  $214^{\circ} 45'$  159.9 feet along Lot 638;
74.  $209^{\circ} 11'$  134.8 feet along Lot 639;
75.  $209^{\circ} 30'$  206.2 feet along Lot 648;
76.  $172^{\circ} 27'$  130.2 feet along Lot 648;
77.  $90^{\circ} 00'$  164.6 feet along Lot 648 to the Tantalus Drive;
78. Thence along Lot 648 on a curve to the right with a radius of 40.0 feet, the direct azimuth and distance being:  $197^{\circ} 30'$  69.2 feet;
79.  $92^{\circ} 44'$  229.3 feet along Lots 647 and 646;
80.  $87^{\circ} 32'$  296.9 feet along Lots 646, 645, 644;
81. Thence along Lot 644 on a curve to the right with a radius of 68.7 feet, the direct azimuth and distance being:  $117^{\circ} 45'$  69.0 feet;
82.  $147^{\circ} 59'$  104.8 feet along Lot 644;

83. Thence across road to the North corner of Lot 643, the direct azimuth and distance being: 61° 02' 156.9 feet, said point being on the boundary of Makiki and Kalawahine;
84. 225° 12' 50 feet, more or less, across road;
85. Thence following along the mauka edge of the Tantalus Road to the middle of gulch, said point being on the boundary of Kalawahine and Kewalo;
86. Thence up the middle of said gulch along the land of Kewalo to the Northeast corner of said land;
87. 176° 15' 513.0 feet along land of Kewalo;
88. 160° 54' 1049.0 feet along the land of Kewalo deeded by the Territory of Hawaii to W. R. Castle to a point in Pauoa Valley;
89. Thence 1200 feet, more or less, to Government Survey Trig. Station "Pauoa";
90. Thence 3950 feet, more or less, up along ridge dividing Nuananu and Pauoa Valleys to the East corner of land deeded to J. H. Wood;
91. Thence 3300 feet, more or less, along land deeded to J. H. Wood to junction of old and new Nuananu Pali roads;
92. Thence along East side of old Nuananu Pali Road to a pipe at the East corner of McIntyre Lot;
93. 141° 05' 446.1 feet along McIntyre Lot to a pipe;
94. 63° 32' 100.0 feet along McIntyre Lot to a pipe;
95. 141° 05' 297.4 feet along J. O. Carter Estate to a pipe;
96. 63° 32' 150.0 feet along J. O. Carter Estate to a pipe;
97. 141° 05' 1756.5 feet along J. O. Carter Estate and land deeded by Kamehameha III to Niniko to top of ridge;
98. 155° 30' 800.0 feet along ridge along Waolani to the head of Waolani Valley;
99. Thence 2200 feet, more or less, across the lands of Kapalama and Kamanaiiki to the East corner of Ouana, L. C. A. 6450, Ap. 8;
100. 159° 09' 2450 feet along Ouana to the Northeast corner of Ouana, L. C. A. 6450, Ap. 8, to stream;
101. Thence 1200 feet, more or less, along stream along Kakuapalau to East corner of L. C. A. 5011, Ap. 1;
102. 232° 10' 1080 feet along stream along Huen;
103. 164° 10' 2260 feet along Government land;
104. 140° 00' 950 feet along Government land to top of ridge;
105. Thence up along said ridge bounding Moanalua and Kalihi Valleys to the junction with the main Koolau Range;
105. Thence along the Watershed of the Koolau Range across the head of Kalihi Valley to the junction of the Kalihi and Nuananu Valleys;
107. Thence along same across the head of Nuananu Valley to the junction of the Nuananu and Manoa Valleys at a peak called Kona-huanui;
108. Thence along same across the head of Manoa Valley to the junction of Manoa and Palolo Valleys at a peak called Mt. Olympus;
109. Thence along same across the head of Palolo Valley to the ridge bounding Palolo and Waialae Valleys;
110. Thence down said ridge to the point of beginning.  
Area, 6950 Acres, more or less.

AND as provided by law, subject to the existing rights and leases, I do hereby SET APART as parts of the HONOLULU WATERSHED FOREST RESERVE those portions of the government lands in the Kalihi and Nuananu Valleys, on Pacific, Makiki and Tantalus Heights, and in Manoa and Palolo Valleys, altogether an area of 5000 acres, more or less, that lie

within the metes and bounds of the above described HONOLULU WATERSHED FOREST RESERVE.

(Seal)

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Great Seal of the Territory of Hawaii to be affixed.

DONE at the Capitol in Honolulu, this 13th day of October, A. D. 1913.

E. A. MOTT-SMITH,  
Acting Governor of Hawaii.

PROCLAMATION OF FOREST RESERVE IN THE DISTRICTS OF NORTH AND SOUTH KOHALA AND OF HAMAKUA, ISLAND AND COUNTY OF HAWAII, TERRITORY OF HAWAII.

UNDER and by virtue of the authority vested in me by the provisions of Chapter 28 of the Revised Laws of Hawaii, as amended by Act 65 of the Session Laws of 1905, and by Act 1 of the Session Laws of 1907, and of every other power me hereunto enabling, I, ERNEST A. MOTT SMITH, Acting Governor of Hawaii, with the approval of a majority of the Board of Commissioners of Agriculture and Forestry, having held the hearing of which notice has been duly given as in said Acts provided, do hereby RECOMMEND and APPROVE as a forest reserve to be called the Kohala Mt. Forest Reserve, those certain pieces of government and privately owned land in the Districts of North and South Kohala and of Hamakua, Island and County of Hawaii, Territory of Hawaii, which may be described roughly as embracing the summit and upper slopes of the Kohala Mountain, and containing an area of 29,627 acres more or less, more particularly described by and on a map made by the Government Survey Department of the Territory of Hawaii, which said map is now on file in the said Survey Department marked Government Survey Reg. Map No. 2037 and "Kohala Mt. Forest Reserve," and a description accompanying the same numbered (U.S.F. No. 2432, which said description now on file in said Survey Department is as follows:

KOHALA MOUNTAIN FOREST RESERVE.

Including portions of the lands of Awini, Honokane, Pololu, Makanikahio 1 and 2, Waiapuka, Niulii, Makapala, Aamakao, Halawa, Halelua, Nunulu, Lamalolua, Kaiholena, Kawaihae 1, Kawaihae 2, the ill of Pukauiwai puaoluukia kapia, Pauahi, Momoualua, Ouli, Lanikepu, Waikoloa, and Puukapu,

In the districts of North and South Kohala, and portions of the ahupuaa of Waipio, the ill of Lalakea and the ahupuaas of Kukuihaele, Waikoekoa, Kamoku, and Kona,

In the District of Hamakua,  
Island of Hawaii.

Beginning at a point on the West edge of Pololu Pali, the true azimuth and distance of said point from the forest monument post set in on the boundary of the lands of Makanikahio and Waiapuka, being 280° 58' 672.0 feet, and the coordinates of said point of beginning referred to Government Survey Trig. Station "Kauhola" and 23,222.1 feet South and 8665.5 feet East, and the boundaries run by true azimuths:

1. 100° 58' 9392.6 feet crossing the lands of Makanikahio 1 and 2, Waiapuka, Niulii, Makapala, and Aamakao to a Forest Monument post set in by the gate of the Kohala Sugar Company's fence on the East side of Aamakao Gulch;
2. 77° 58' 8921.4 feet crossing the lands of Aamakao, Halawa, Halelua and Nunulu to the fence on the East side of the present Waimea-Halawa Road;

3. Thence along said fence, crossing the lands of Nunulu, Lamaloloa, and into Kaihohena, direct azimuth and distance being  $9^{\circ} 8' 3997.0$  feet;
4. Thence along said fence, crossing and along the land of Kaihohena to the land of Halawa, direct azimuth and distance being  $271^{\circ} 25' 1240.0$  feet;
5. Thence mauka along said fence, bounding Halawa, to the makai corner of Kehena (Government Land), direct azimuth and distance being  $348^{\circ} 40' 1488.0$  feet;
6. Thence along the fence bounding Kehena (Government Land) and the land of Halawa to Mahinakaka (Guleh, the direct azimuth and distance being  $296^{\circ} 30' 1072.0$  feet;
7. Thence along said fence, bounding Kehena (Government Land) and the land of Halawa to Hoooleipalaoa Guleh, the direct azimuth and distance being  $291^{\circ} 15' 2022.0$  feet;
8. Thence the boundaries follow the land of Kehena 2nd by descriptions in Certificate No. 17 along the heads of the lands of Aama-kao, Makapala, Niulii, Waipuka, Makanikahio 1 and 2, to West edge of Pololu Valley, thence mauka and around the edge of Pololu Valley to Honokane (as per Boundary Certificate No. 14), at rock + called Kanenu on West edge of Honokane Guleh;
9.  $2^{\circ} 20' 5280.0$  feet along brow of Honokane Guleh;
10.  $29^{\circ} 50' 4884.0$  feet along brow of Honokane (Guleh to a small hill called Kilohana at rock marked K on ledge;
11.  $11^{\circ} 52' 3130.0$  feet along the land of Kahualilili to a projecting spur in Honokane Guleh;
12.  $21^{\circ} 17' 3130.0$  feet along the land of Kahuanui, the boundaries following the winding of the top of Honokane Guleh to a double cross on stone set in the ground on the South peak of the Hinamakanui Crater, this point being the common corner of the lands of Kahuanui, Waika, and Honokane;
13.  $294^{\circ} 20' 4592.0$  feet along the land of Waika to "Waihoelana" (a large cross in triangle) cut in the top of a rock mound, from which the true azimuth and distance is  $148^{\circ} 01' 131.2$  feet to the common corner of the lands of Waika, Kawaihae 1st, and Honokane Nui;
14.  $72^{\circ} 10' 7640.0$  feet along the land of Waika to a point from which the true azimuth and distance to "Puu Pili" Trig. Station is  $138^{\circ} 45' 10" 3496.5$  feet;
15.  $318^{\circ} 45' 10" 9499.5$  feet, following the mauka fence to the guleh on the boundary of Kawaihae 1st and Kawaihae 2nd;
16.  $303^{\circ} 47' 17" 3308.3$  feet, following the mauka fence to angle in same;
17.  $334^{\circ} 33' 30" 5263.8$  feet, following the mauka fence to the guleh on the boundary of Kawaihae 2nd and Puukawilwai;
18.  $43^{\circ} 19' 788.0$  feet down guleh;
19.  $295^{\circ} 43' 8892.3$  feet following the mauka fence;
20.  $00^{\circ} 50' 30" 3195.0$  feet following the fence;
21.  $273^{\circ} 12' 8334.2$  feet to a point on the ridge;
22.  $309^{\circ} 34' 30" 7590.2$  feet along the mauka fence to the West side of Puukapu Homesteads, 1st Series;
23.  $234^{\circ} 25' 00" 2600.0$  feet following the fence across the mauka tier of Puukapu Homesteads, 1st Series, to Hauani Guleh, on the Eastern boundary of said Homesteads;
24. Thence following down Hauani Guleh to the present forest fence, dividing the pasture land between this and the back line of Puukapu Homesteads, 2nd Series, said point being 7192.4 feet North and 8488.0 feet West from the Government Survey Trig. Station "East Base."

25. 238° 10' 3100.0 feet along the present forest fence;
26. 249° 30' 5980.0 feet along and through forest to corner of fence, the true azimuth and distance from a pile of stones with stone marked with the sign of an anchor being 159° 25' 970.0 feet;
27. 258° 10' 4800.0 feet along and through forest to corner of fence near the head of the land of Lalakea;
28. 200° 16' 50" 10,373.2 feet following the mauka fence line to a stone marked + at corner of fence, said point being the North-west corner of Homesteads (private subdivision);
29. 312° 59' 3107.0 feet to the boundary of Lalakea and Waikoekoe at the old Mahiki Road at Waapa;
30. 281° 30' 8050.0 feet across the land of Waikoekoe, passing road at 400 feet to corner of fence;
31. 194° 20' 1137.0 feet along fence to corner;
32. 259° 30' 2012.0 feet along fence;
33. 177° 20' 1404.0 feet along fence;
34. 197° 40' 4134.0 feet along fence to corner of present forest reserve on boundary of Mooiki and Kean;
35. 88° 00' 5490.0 feet to point on the road to Waimen (Mud Lane) which is distant from "Puu Manu" Trig. Stations 4360.0 feet, the true azimuth being 22° 15';
36. 92° 50' 2760.0 feet to a point mauka of No. 1 Reservoir of the Pacific Sugar Mill Co.;
37. 123° 05' 4270.0 feet to a point on the boundary of Waipio above Hiihawe Falls; thence along the top edge of the East Pali to Waipio Valley, the general azimuths and distances being:
38. 129° 40' 860.0 feet;
39. 147° 50' 930.0 feet;
40. 117° 12' 110.0 feet to the top of Punaahuku Ridge, where the boundary of Lalakea descends into Waipio Valley;
41. 31° 20' 5750.0 feet to a point where the boundary of Lalakea again meets the top of pali;
42. 30° 30' 450.00 feet along top of pali;
43. 11° 00' 1050.0 feet along top of pali;
44. 103° 40' 5200.0 feet, more or less, across Waipio Valley to the top of the West pali;
45. Thence following along the North side of Kawaiimi branch of Waipio Valley, crossing the head of Waimanu Valley, thence in a Westerly direction along the boundary of Hamakua and Kohala (being also the South boundary of the HAMAKUA PALI FOREST RESERVE) to the junction of the lands of Honokane, Kawaihae 1st, and Puukapu;
46. Thence along down between the boundary of the land of Honokane and the HAMAKUA PALI FOREST RESERVE IN A Northerly direction;
47. Thence along down the middle of Honokane Gulch to its intersection with the boundary between Awini Homestead Lots 2 and 3;
48. Thence along the boundary between said Lots 2 and 3, and 1 and 4 of the Awini Homesteads, the true azimuth and distance being 90° 00' 4104 feet to the Honokane iki Gulch;
49. Thence down the Honokane Gulch to the sea;
50. Thence along the sea to "Kapili Rock" on the boundary of the lands of Honokane and Pololu;
51. Thence still along the sea to a point on the edge of the pali called "Pohaku Kumaka" on the boundary of the lands of Pololu and Makenikahio 1st;
52. Thence following the boundary between Pololu and Makenikahio 1st to the point of beginning.



Excepting and Reserving from the ahupuaa of Pololu, the kuleanas, the privately owned ili of Pa-u, and the Government rice and other bottom lands in Pololu Valley, area 300 acres, more or less.

Total area, 29,627 acres, more or less. (In government ownership, 14,204 acres.)

AND as provided by law, subject to the existing leases, I do hereby SET APART as parts of the Kohala Mountain Forest Reserve those portions of the government lands of Owini (100 acres), Pololu (1000 acres), Lamaloloa (24 acres), Kawaihau 1st (3370 acres), Pukawaiwai-Panolunkia-Kapia (360 acres), Pauahi (150 acres), Momoualon (130 acres), Lanikepu (435 acres), Puukapu (8385 acres), Kamoku (20 acres), and Kena (230 acres), altogether an area of 14,204 acres, more or less, that lie within the metes and bounds of the above described Kohala Mountain Forest Reserve.

(Seal)

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Great Seal of the Territory of Hawaii to be affixed.

DONE at the Capitol in Honolulu this 13th day of October, A. D. 1913.

E. A. MOTT-SMITH,  
Acting Governor of Hawaii.

# PROCLAMATION OF FOREST RESERVES IN THE DISTRICTS OF HILO AND PUNA, ISLAND AND COUNTY OF HAWAII, TERRITORY OF HAWAII.

UNDER and by virtue of the authority vested in me by the provisions of Chapter 28 of the Revised Laws of Hawaii, as amended by Act 65 of the Session Laws of 1905, and by Act 4 of the Session Laws of 1907, and of every other power me hereunto enabling, I, KENEST A. MOTT-SMITH, Acting Governor of Hawaii, with the approval of a majority of the Board of Commissioners of Agriculture and Forestry, having held the hearing of which notice has been duly given as in said Acts provided, do hereby, subject to the existing leases, SET APART as forest reserves, to be called respectively the UPPER WAIAKEA FOREST RESERVE and the UPPER OLA A FOREST RESERVE, those certain pieces of government land in the Districts of Hilo and Puna, Island and County of Hawaii, Territory of Hawaii, which may be described roughly as being the block of native forest on the lower slopes of Mauna Loa lying above the agricultural land back of Hilo and to the north and west on the various Olaa homestead subdivisions, and containing, respectively, areas of 51,800 acres and 9280 acres, more or less, more particularly described by and on a map made by the Government Survey Department of the Territory of Hawaii, which said map is now on file in the said Survey Department marked Government Survey Reg. Map No. 1808, and "Upper Waiakea" and "Upper Olaa Forest Reserves," and descriptions accompanying the same, numbered respectively U.S.F. Nos. 2430 and 2476, which said descriptions, now on file in the said Survey Department, are as follows:

## UPPER WAIAKEA FOREST RESERVE.

Portions of the Government lands of Pihoouua and Waiakea,  
District of Hilo, Island of Hawaii.  
O.S.F. No. 2430.

Beginning at the Government Survey Trig. Station "Kulanui" at the intersection of the lands of Olaa, Keaouou, and Waiakea, as shown on Government Survey Reg. Map No. 1808, and running by true azimuths:

1. 162° 58' 50,790 feet, more or less, along the land of Waiakea to a point at lower Mawae, near a small island in lava flow;

2. Thence along the HILLO FOREST RESERVE along edge of lava flow of 1855 to the Northwest corner of the land of Punahoa 2nd, the direct azimuth and distance being: 256° 27' 33,580.0 feet, more or less;
3. 341° 00' 7000 feet, more or less, along the land of Punahoa 2nd;
4. 93° 20' 5230.0 feet, more or less, along the land of Kaunama;
5. 1° 00' 640.0 feet, more or less, along the land of Kaunama;
6. 29° 30' 2750 feet, more or less, along the land of Kukuau 2nd;
7. 350° 00' 1150 feet, more or less, along the land of Kukuau 1st to a point a little South of the lower end of a small branch of the lava flow of 1855 at a place called Kapualei;
8. 285° 30' 24,500 feet, more or less, along the land of Kukuau 1st;
9. 309° 21' 26,710.0 feet, more or less, across the land of Waiakea to the North corner of Lot 232 of the Olaa New Tract Lots;
10. 63° 20' 62,845.7 feet, more or less, along the Olaa New Tract Lots, and the Land of Olaa to the point of beginning.

Area, Waiakea, 51,200 acres; Pinhomua, 600 acres. Total area, 51,800 acres.

#### UPPER OLA A FOREST RESERVE.

Portion of the Government Land of Olaa, District of  
Island of Hawaii.  
C.S.F. No. 2176.

Beginning at the Government Survey Trig. Station "Kulani" (marked by a copper bolt in a concrete post) at the intersection of the lands of Olaa, Keauhau, and Waiakea, as shown on Government Survey Reg. Map No. 1808, and running by true azimuths:

1. 243° 20' 12,694.0 feet along the land of Waiakea;
2. 318° 32' 30" 26,210.0 feet along the Southwest side of Cross Road No. 8 to a point on the Northwest boundary of Lot IV of the Otto Rose Settlement Association Lots;
3. 59° 31' 4492.0 feet along Lots IV and V of the Otto Rose Settlement Association Lots;
4. 149° 31' 3000.0 feet along Lot V of the 27½ Mile Tract;
5. 59° 31' 5858.0 feet along Lots V and VI of the 27½ Mile Tract;
6. 329° 31' 6000.0 feet along Lots VI and VII of the 27½ Mile Tract;
7. 59° 31' 2950.0 feet along Lots VII, VI and V of the Kilauea Settlement Association Lots and across Wright Road;
8. 329° 31' 1000.0 feet along the Southwest side of Wright Road to the North corner of Lot IV of the Kilauea Settlement Association Lots;
9. 59° 31' 4356.0 feet along Lots IV, III, II and I of the Kilauea Settlement Association Lots;
10. 149° 31' 30,575.0 feet along the land of Keauhau to the point of beginning.

Area, 9280 acres.

(Seal)

IN WITNESS WHEREOF, I have hereunto  
set my hand and caused the Great Seal of  
the Territory of Hawaii to be affixed.  
DONE at the Capitol in Honolulu, this 13th  
day of October, A. D. 1913.

E. A. MOTT-SMITH,  
Acting Governor of Hawaii.

**PROCLAMATION OF MODIFICATION OF BOUNDARY OF THE MOLOAA FOREST RESERVE, DISTRICTS OF HANALEI AND KAWAIHAU, ISLAND AND COUNTY OF KAUAI.**

UNDER and by virtue of the authority vested in me by the provisions of Chapter 28 of the Revised Laws of Hawaii, as amended by Act 65 of the Session Laws of 1905, and by Act 4 of the Session Laws of 1907, and of every other power me hereunto enabling, I, ERNEST A. MOTT-SMITH, Acting Governor of Hawaii, with the approval of a majority of the Board of Commissioners of Agriculture and Forestry, having held the hearing of which notice has been duly given as in said Acts provided, do hereby MODIFY the boundary and slightly change the area of the Moloka Forest Reserve in the Districts of Hanalei and Kawaihae, Island and County of Kauai, Territory of Hawaii, created and set apart by Proclamation of the Governor of Hawaii, on June 5, 1909, by eliminating therefrom an area of 83 acres and by adding thereto an area of 34 acres, which modification of boundary is more particularly shown by and on a map made by the Government Survey Department of the Territory of Hawaii, which said map is now on file in the said Survey Department, marked Government Survey Reg. Map No. 2375 and "Moloka Forest Reserve," and a description accompanying the same, numbered C.S.F. No. 2431, which said description now on file in the said Survey Department, and hereby approved as now constituting the official description of the Moloka Forest Reserve, differs from the original description (C.S.F. No. 1961) that forms a part of the proclamation of the Moloka Forest Reserve, in the following courses:

1. 277° 55' 4748.2 feet crossing Pilaa, the South portion of Grant 757 to Castro, the Moloka Stream and the Government portion of Moloka to a Forest Reserve Monument at small ridge North of the old Swift Mountain House; elevation 739 feet;
2. 244° 59' 3810.3 feet across Government portion of Moloka to a Forest Reserve Monument in a pile of rocks about 100 feet North of Kalina's grave; elevation 593 feet;
3. 301° 16' 30" 1034.6 feet across Government portion of Moloka to a Forest Reserve Monument on ridge at "Puuolemanu" just West of Keapawee Stream; elevation 643 feet;
4. 282° 15' 4026.0 feet crossing the Keapawee Stream, the Lindsay Lot and Grant 540 to E. Rouzel to a redwood post;
5. 207° 08' 866.2 feet along Grant 549 to Ed. Rouzel to a + on stone;
6. 304° 48' 469.2 feet along the South side of Grant 535 to a + on stone;
7. 320° 15' 4239.0 feet along Moloka Hui land to a redwood post;
8. 312° 51' 1228.2 feet across Papaa (Moloka Hui lands) into land of Aliomanu (Moloka Hui Lands) to a Forest Reserve Monument at "Nakii"; elevation 320 feet;

AND, as provided by law, I do hereby ELIMINATE from the Moloka Forest Reserve the area lying between the lines in the old and in the new descriptions numbered Courses 1 and 2 (83 acres), and do likewise hereby SET APART as an integral part of the said reserve the area (34 acres) bounded by Courses 4 to 8 inclusive of the said revised description, C.S.F. No. 2431, lying within the metes and bounds of the MOLOAA FOREST RESERVE.

(Seal)

IN WITNESS WHEREOF, I have hereunto set my hand and caused the Great Seal of the Territory of Hawaii to be affixed.  
DONE at the Capitol in Honolulu, this 13th day of October, A. D. 1913.

E. A. MOTT-SMITH,  
Acting Governor of Hawaii.

# Hawaiian Gazette Co.

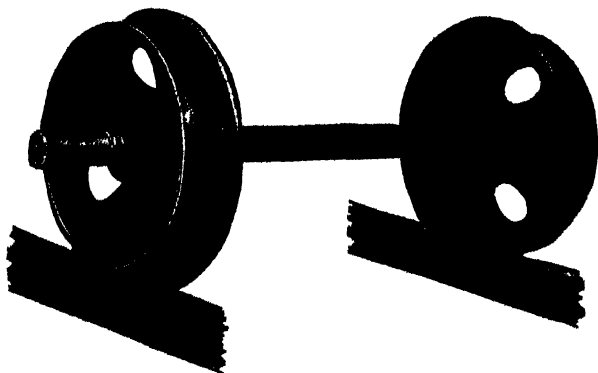
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# THE HAWAIIAN FORESTER AGRICULTURIST

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VOL. X.

NOVEMBER, 1913.

No. 11.

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Next to the control evidenced over the various maladies of different species of livestock, there is nothing more gratifying in the report of the Division of Animal Industry for October than the information relative to the comparative cleanliness of stables in Honolulu. Not long ago there was much to be desired in this respect. In view of published medical opinion that infantile paralysis is communicated by the stable fly, this subject is of more than ordinary importance to human beings.

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That only nine animals should have been condemned out of 377 tested in October indicates that the control of bovine tuberculosis on this island has advanced far beyond the fabric of a dream. It is up to the other islands to prosecute the campaign to a like degree of success, when Hawaii will stand out prominently among all countries for intelligent grappling with this vital concern.

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Last month the Division of Entomology made the usual fine record of pests intercepted. The monthly figures on this score are among the most interesting information published of the various services of the territorial Board of Agriculture and Forestry.

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More than three-quarters of a million acres of forest reserves place Hawaii, in proportion to its area, well up in the list of countries that are conserving and extending their resources of this description of public wealth. In time this insular territory may not have to bewail the absence of mineral deposits as a source of public revenue, for when developed thoroughly upon the lines now being followed the forests, both public and private, will yield a large tribute to territorial and county treasuries, in direct and indirect realizations.

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It may take years to show results in large measure, but the gift of prophecy is not required to foresee the time coming when the work of the Division of Hydrography, begun as it were only yesterday, will have fruition in the transforming of many thousands of acres of now arid desert and mountain wilderness into land of teeming productivity of useful animals and plants.

Rivers of waters today seen, at different seasons, rushing wastefully over cliff into ocean will be diverted inland to fatten field and pasture. Not only that, but the habitations of men in town, village and country will be lighted, as well as furnished with power for domestic industries, by the agency as yet latent in the wasting floods.

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## DIVISION OF ANIMAL INDUSTRY.

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Honolulu, Oct. 31, 1913.

Hon. W. M. Giffard, President and Executive Officer, Board of Agriculture and Forestry.

Sir:—I have the honor to present herewith a report on the work of the Division of Animal Industry for the month ending October 31, 1913:

### *Bovine Tuberculosis Control.*

With the exception of a part of the cattle on the railroad ranches, comprising about a week's work, the present test is finished and the tabulated results will be presented to the board shortly, in a separate report.

### *Glanders.*

Two suspicious cases have occurred during the month, but in neither case has the diagnosis been confirmed. It was nevertheless decided to submit all stables in Honolulu to a thorough inspection. This work is more than half finished and has proved satisfactory so far as the sanitation of most of the premises is concerned. Some of the Oriental, and especially Japanese, stables leave much to be desired so far as comfort of the animals go, but are as a rule fairly clean.

The race horse Sonoma, which the owner wished to ship to California, reacted to the mallein test and is at present at the quarantine station. The animal is apparently in perfect health and a report on her condition has been sent to the federal inspector in charge of the port of San Francisco in order to obtain his permission before shipment is made, the regulations requiring the mallein test of horses shipped into California.

### *Hog Cholera.*

This disease seems to have abated to a very great extent, no new outbreaks being reported for the past two weeks, though undoubtedly the infection still lingers in most of the pens where animals have died and where the survivors were vaccinated. No

new hogs should therefore be introduced in these herds as yet unless previously injected with serum.

A shipment of two hogs arrived from San Francisco on the 28th unaccompanied by the requisite certificates of health, wherefore they were sent to the quarantine station for two weeks as stipulated in the regulations of this board.

A large piggery at Wahiawa reported the death of a considerable number of small pigs, and an investigation was made. No indication of hog cholera was found, the condition being ascribed to faulty feeding, that is, exclusive swill diet, and a decided lack of lime salts or bone building material in the daily rations. Bone meal, green feed and medicinal treatment were recommended along the lines described in the article on hog cholera published in last Sunday's Advertiser.

### *Rabies.*

The importation of dogs has fortunately fallen off to some extent, the number in quarantine during the past month ranging from 13 to 19. As stated in a previous communication rabies and hydrophobia are steadily increasing in California, for which reason an article on this subject is being prepared for publication. Another attempt, or suspected attempt, at landing a dog from the transport Dix (the dog disappearing after the visit of the inspecting officer, who was told that all of the dogs on board, four in number, were destined for Manila), makes it desirable that the general public should be familiarized with the true nature of this disease and made to realize what the consequences of its introduction here might mean.

Since the above was written there have arrived no less than thirteen dogs here, the majority of which, however, are transients. Nine come with a clean bill of health from New Zealand, a country officially recognized as free from rabies, and are therefore being kept under observation only, but not in quarantine. The other four were taken to the Quarantine Station.

Very respectfully,

VICTOR A. NORGAARD,  
Territorial Veterinarian.

### REPORT OF ASSISTANT VETERINARIAN.

Honolulu, Oct. 30, 1913.

Dr. V. A. Norgaard, Chief of Division of Animal Industry.

Sir:—I have the honor to submit the following report for the month of October:

### *Tuberculosis Control.*

During the past month the following dairy herds have been subjected to the intradermal tuberculin test:



	T.	P.	C.
Sept. 20-Oct. 2, Waianae Plantation.....	130	122	8
Sept. 30-Oct. 3, Laie Plantation.....	21	21	0
Sept. 30-Oct. 3, Kahuku Plantation.....	9	9	0
Sept. 30-Oct. 3, Waialea School.....	43	43	0
Sept. 30-Oct. 3, Y. Agawa.....	5	5	0
Oct. 1-Oct. 4, G. Schuman.....	5	5	0
Oct. 6-Oct. 9, S. Kanakanui.....	2	2	0
Oct. 14-Oct. 17, Kahuku Ranch.....	97	96	1
Oct. 14-Oct. 17, Kawailoa Ranch.....	65	65	0

The above tabulated list gives a total of 377 head injected and examined for the month, out of which number 368 were passed and 9 condemned and branded.

Next month, November, testing will commence on the railroad ranch at Mokuleia where between six and seven hundred head await inspection. So far 162 head of the railroad's cattle have been inspected with but one reaction, which is a very good showing and would indicate that very few tuberculous cattle will be found on the ranch.

### *Inspection of Stables.*

A thorough and systematic inspection of stables throughout the city was started during the past month and the results, as far as we have gone, are very gratifying both as to the health of the animals and sanitary condition of the stables. Due to the activities of the humane officers no cripples nor animals otherwise unfit for work were found in harness, and out of 167 head inspected in stables only three were incapacitated for work.

As a rule the stables were in very good condition and while the majority had dirt floors they were kept clean and in a sanitary condition. In only two instances were they found in a filthy condition, and the owners were at once informed that the stalls must be cleaned and drained, and plenty of whitewash used. This work will have a very beneficial effect not only in the apprehension and elimination of hidden cases of glanders, if there are any, but in improved sanitation which always follows inspections of this nature.

### *Importation of Live Stock.*

Oct. 3—S. S. Ventura, Sydney: 7 seals for theatrical purposes.

Oct. 7—S. S. Honolulu, San Francisco: 12 horses, 3 mules, D. Ferreira; 2 crates poultry, A. Lambert; 1 crate poultry, Capt. Green; 12 crates poultry, N. B. Lansing; 1 crate poultry, W. F. X. Company.

Oct. 5—S. S. Hyades, Seattle: 1 crate ducks, Mr. Berger.

Oct. 13—S. S. Sierra, San Francisco: 1 crate poultry, E. F. Bishop; 4 crates poultry, A. Carriero; 4 crates poultry, N. B. Lansing; 3 crates poultry, C. G. Peterson; 8 crates poultry, F.

Harrison; 2 crates poultry, E. O. Hall & Son; 1 black Angora cat, A. Lucas.

Oct. 15—S. S. Shinyo Maru, Orient: 1 crate Jap games, X. Kiyomago; 1 crate Jap games, K. Tateya.

Oct. 21—S. S. Lurline, San Francisco: 5 crates poultry, N. B. Lansing; 2 crates poultry, H. G. Wooten; 4 crates poultry, E. O. Hall & Son; 4 crates poultry, A. Carriero; 1 crate poultry, W. F. X. Co.

Oct. 24—S. S. Siberia, Orient: 1 black chow dog, J. M. Riggs.

Oct. 27—S. S. Ventura, San Francisco: 9 crates poultry, W. F. X. Co.

Oct. 28—S. S. Wilhelmina, San Francisco: 2 crated Berkshire boars, E. O. Hall & Son, quarantined at station for two weeks as they were not accompanied by any certificates of health as required by the regulations governing the importation of swine into the Territory.

Oct. 29—U. S. A. T. Dix, Seattle: 286 head of horses and mules, Quartermaster's Dept.; 5 dogs.

Respectfully submitted,

L. N. CASE,  
Assistant Territorial Veterinarian.

## DIVISION OF ENTOMOLOGY.

Honolulu, Oct. 31, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen—I respectfully submit my report of the work of the Division of Entomology for the month of October as follows:

During the month 43 vessels arrived at the port of Honolulu of which 25 carried vegetable matter and one vessel moulding sand.

<i>Disposal</i>	<i>Lots</i>	<i>Parcels</i>
Passed as free from pests.....	884	24,782
Fumigated . . . . .	3	255
Burned . . . . .	49	108
Returned . . . . .	2	26
Total inspected . . . . .	938	25,171

Of these shipments 24,927 packages arrived by freight, 128 packages by mail and 16 packages as baggage of passengers and immigrants.

### *Rice.*

During the month 19,475 bags of rice arrived from Japan, which, after close inspection, were found to be free from pests and were passed for delivery.

*Pests Intercepted.*

Thirty packages of fruit and 18 packages of vegetables were found in the baggage of passengers and immigrants from foreign countries. These were all seized as usual and destroyed by burning. Four lots of chestnuts from Japan were found badly infested with the large chestnut weevil (*Balaninus* species) and were burned. Twenty-six packages of fruit from the Coast were returned to shipper on account of being infested with codlin moth and peach moth.

A shipment of chrysanthemum plants contained a colony of ants. The shipment was fumigated with carbon bisulphide and all soil carefully removed. The species (*Prenolepis obscura*) has been intercepted several times during the past few years.

*Hilo Inspection.*

Brother M. Newell of Hilo reports the arrival of four steamers during the month, all of which carried vegetable matter consisting of 237 lots and 4010 parcels. As all shipments were free from pests they were allowed to land.

*Beneficial Insects.*

Twelve lots of inoculated Japanese beetles were delivered during the month.

*Inter-Island Inspection.*

During the month of October 58 steamers were attended to and the following shipments were passed:

Plants . . . . .	34 packages
Taro . . . . .	585 "
Fruit . . . . .	45 "
Vegetables . . . . .	58 "
Total passed . . . . .	722 "

The following packages were refused shipment:

Fruit . . . . .	8 packages
Plants . . . . .	11 "
Vegetables . . . . .	2 "
Total refused . . . . .	21 "

All of these were refused on account of either being infested with pests or having soil attached to the plants.

Your superintendent returned from his trip to the Coast on November 4. While in California I got in touch with the several

State departments and also came in direct touch with some of the leading fruit dealers and heads of the steamship lines. These people are very anxious to cooperate with the Division of Entomology in every way. They appreciate the firm stand we have taken in regard to infested shipments and are particularly anxious to maintain the large trade they now have with the Islands and will see to it that our demands are complied with.

Respectfully submitted,

E. M. EHRLHORN,  
Superintendent of Entomology.

## DIVISION OF FORESTRY.

Honolulu, Oct. 31, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I have the honor to submit as follows the routine report of the Division of Forestry for October, 1913:

### *New Forest Reserves.*

Pursuant to the required call a public hearing was held on October 8, by the Acting Governor and members of the Board of Commissioners of Agriculture and Forestry to consider the creation of four forest reserves on Hawaii and Oahu, of which mention has been made in earlier reports. No opposition was offered to any of these projects. On October 13 the Acting Governor signed proclamations establishing the boundaries and setting apart the government lands contained therein. The new reserves are as follows:

Name	District	Total area acres	Area (gov't. land acres)
Kohala Mountain, Kohala and Hamakua, Ha-			
waii . . . . .		29,627	14,204
Upper Waiakoa, Hilo, Hawaii . . . . .		51,800	51,800
Upper Olaa, Puna, Hawaii . . . . .		9,280	9,280
Honolulu Watershed, Honolulu, Oahu . . . . .		6,950	5,000

At the same hearing there was considered the modification of a section of the boundary of the Moloaa forest reserve on Kauai. This also was approved by the Acting Governor. With these changes there are now 34 forest reserves in Hawaii, having an aggregate total area of 786,869 acres, of which 540,877 acres, 69 per cent, is government land.

*Trip to Hawaii.*

From October 11 to the end of the month I was away from Honolulu on a field trip that covered the Districts of Puna and Hilo, on the Island of Hawaii. Directed primarily to securing information as to forest fencing requirements, this trip enabled me to secure various other data in regard to the present condition of the forests in those districts. I first visited Puna to see the operations of the Hawaii Hardwood Company, successor to the Hawaiian Lumber Company, that holds a license to cut ohia on government land. Next I spent several days along the upper edge of the forest covering the lower slopes of Mauna Kea in the Hilo district, more particularly along the line of forest fence maintained by the Puu Oo ranch. On my return I came down through the forest on the government land of Manowalee, at present under lease to the Kukaiau Ranch Company.

I then worked along the coast toward Hilo, visiting and inspecting the lower boundary of the forest above the cane fields in the Hilo district, but more especially observing the conditions on government land and on untaken homestead lots at or near the edge of the forest. Similarly I put in two days back of Hilo on the lands between and including Kaiwika and Pihoonua.

The remainder of my trip was devoted to a visit to the upper Olaa section, to get in touch with present conditions in the forest and to look into several special problems peculiar to that region. The result of my observations in the Puna and Hilo districts will form the subject of a special report soon to be submitted to the board.

*Hilo Sub-Nursery.*

While in Hilo I visited the sub-nursery maintained by the Board of Agriculture and Forestry under the direction of Brother Matthias Newell. As at the time of earlier visits, this nursery was found to have on hand a good assortment of seedlings of the kinds of trees most in demand on Hawaii. Notice has been given so often that trees may be obtained from Brother Matthias that it seems almost superfluous to repeat the offer, but in case this report comes under the eye of anyone wanting trees, who does not know it, mention may again be made of this effort of the Board of Agriculture and Forestry to get seedling trees into the hands of those who want them.

The section naturally served from the Hilo nursery covers the Hilo and Puna districts and such parts of Hamakua as are within reach of the Hilo railroad. Application for trees should be made direct to Brother Matthias at Hilo.

*Routine Work.*

During October the usual routine work of the Division of Forestry has gone steadily on. A detailed account of it is given in the report of the Forest Nurseryman, which is transmitted herewith. Not a little attention this past month has been given to preparing for the free distribution of trees on Arbor Day. By proclamation of the Acting Governor, Friday, November 14, has been designated this year as the day so to be observed. As usual any person desiring to plant trees may, on condition that he will agree to care for them, have 24 seedlings, free, on Arbor Day.

Very respectfully,

RALPH S. HOSMER,  
Superintendent of Forestry.

## REPORT OF FOREST NURSERYMAN.

Honolulu, Oct. 31, 1913.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir:—I herewith submit a report of the work done during the month of October, 1913:

*Nursery—Distribution of Plants.*

	In seed boxes	In boxes transplanted	Pot grown	Total
Sold . . . . .	.....	.....	169	169
Gratis . . . . .	1000	350	1925	3275
	1000	350	2094	3444

*Collections.*

Collections on account of plants sold amounted to.....	\$ 6.50
Proceeds of sale of automobile by Water Works Dept. 520 1775 of \$350.....	101.40
Total . . . . .	\$107.40

*Plantation Companies and Other Corporations.*

The distribution during the month amounted to 8000 plants in seed boxes and 6600 in transplant boxes.

*Makiki Station.*

Both at this station and at the nursery much of the time has been taken up in getting trees ready for Arbor Day. We have now ready for distribution a large number of well grown plants.

*Honolulu Watershed Planting.*

The work on the face of Sugar Loaf is progressing and a large number of holes are now dug and ready for planting which will commence just as soon as the ground gets sufficiently moist. A tool and shelter shed has been erected so that the transplanting can be done during heavy rains. The water which we are able to collect from the roof of the shed will be sufficient to take care of the trees in the small nursery adjoining. One dozen 50-gallon barrels have been set up for the purpose of storing the water.

The preliminary work (consisting of making trails and putting up the buildings, etc.) being completed, we will now be able to devote all of our time to the propagating and care of the tree.

*U. S. Experimental Planting, Nuuanu Valley.*

The severe drought has made it necessary at times to carry water from quite a distance to keep the trees in the nursery alive. This and other routine work has kept the man busy.

Respectfully submitted,

DAVID HAUGHS,  
Forest Nurseryman.

## DIVISION OF HYDROGRAPHY.

November 6, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—The following report of operations of the Division of Hydrography for the month of October, 1913, is submitted:

*Drought.*

Official reports from Kauai, Oahu and Maui, and rumors from Hawaii indicate that the extreme drought still continues on Oahu and Maui, but has been at least temporarily broken by heavy rains on Kauai and Hawaii.

*Kauai Irrigation Projects.*

The undersigned completed an inspection and reconnaissance trip on Kauai during the month, and visited all mountain stations, including the rainfall station on Waialeale (5080 feet), the "top" of Kauai.

While it is not within the province of this division to project irrigation schemes, the intelligent investigation of surface water resources demands looking into the future in regard to water utilization.

It is well known that leeward Kauai has suffered from lack of water at dry periods for many years, while on windward Kauai the Wainiha, Lumahai, Waioli, Hanalei and Kalihiwai streams have been wasting hundreds of millions of gallons per day into the sea during these same periods.

The low water discharge from the Kilauea, Anahola, Kealia, Kapaa and Wailua valleys is all needed in the immediate vicinity.

Heretofore the estimated cost of diverting these big windward streams has been considered too high to justify the project, but, regardless of the economic prospect for the next few years, this big project is certain to develop in the next decade. Temporary measures in the nature of the Kauai Electric Power Company for pumping and the new \$150,000 ditch from the South Wailua to Koloa, which is to be started by the Lihue Plantation Company in the near future, will only partially relieve this shortage.

It is estimated that these streams should be diverted at an elevation of about 700 feet above sea level to deliver water at the 650 feet contour in the Wahiawa and Koloa valleys. At these elevations it is impossible to obtain gage readers, and, except on the Wainiha stream, which may be ascended on the power line ditch trail, these points are at present inaccessible by trail of any kind.

Suitable sites for automatic clock register stations have been located on the Wainiha, Lumahai, Hanalei and Kalihiwai streams, at about the 700 feet level, and trails will be cut to these points and stations will be established during November and December.

A station will be established on the Waioli, the smallest of the five, as soon as more funds are available. From dry weather measurements made at low levels it is estimated that 150 million gallons per day can be diverted from these five streams, and sufficient water be left in the streams to supply present rice and taro lands.

### *Kauai.*

The drought was broken by a general rain which covered the entire island on October 24, 25 and 26, and which, contrary to usual practice, was heaviest at low levels and on the leeward side of the island. Mr. Hardy spent 15 days, October 10-24, with the superintendent on reconnaissance and inspection. All mauka stations, including Waialeale (5080 feet) were visited, and future clock register station sites located. Station sites were also selected on the Olokele, Kealia, Wainiha, Waioli, Lumahai, North Wailua and Kalihiwai streams. The first seven days were spent on computation and compiling work in connection with the third quarter gage height records. The last seven days were spent



on stream measurements and accounts. Mr. Horner was detained in Waima twelve days on account of his wife's serious illness. The balance of the month was spent on gathering rainfall records and stream measurements.

### *Maui.*

Both Mr. Bailey and Mr. Christiansen were employed during almost the entire month on the construction of five new clock register stations on the streams of East Maui. Besides the four stations on the Kailua, Nailililihaele, Waikamoi and Hāipuaena streams, which were completed in September, work was started on the Hanawi, East and West Kopiliula, East Wailuaiki and Wailuanui streams. Twelve stream measurements were made.

The extreme drought on Maui still continues, and plantations are suffering for want of water.

### *Oahu.*

A concrete weir with a low water 2.0 feet crest opening, and a flood water 12.0 feet crest opening, was begun on the upper Nuuanu stream on October 10, and work was temporarily suspended on October 18, to allow for necessary change of design. This weir is to measure waste water of the Nuuanu valley to determine whether the amount is sufficient to augment the present city supply. The discharge so far indicates that a mean of about one-half million gallons per day may be added to the city's supply at this point.

A reconnaissance and miscellaneous measurements were made of the springs and small streams supplying the Makawao ditch which serves the Waimanalo plantation. These measurements, as well as measurements on the Kaukonahua, show that the drought still continues on Oahu.

Seepage and miscellaneous measurements were made on a number of the ditches of the Oahu Sugar Company, and a measurement made of the outflow from the north portal of the Waiahole tunnel shows that this discharge has decreased to 14.6 million gallons per day, and is steadily decreasing.

### *Kona, Hawaii.*

The field work of this, excepting the maintenance of rain gages and one stream gaging station on the Kiilae stream, is nearing completion. All reservoir sites have been completed, and the population and present water supply census is nearly so. The undersigned, accompanied by Mr. T. F. Sedgwick, underground water expert, expects to spend November 10 to 13, in looking

over dry weather conditions in Kona. It is expected that all field work, excepting rain and stream gaging maintenance, will be completed by November 30, 1913.

Very respectfully,

G. K. LARRISON,  
Superintendent of Hydrography.

### THE KALO IN HAWAII (I').

By VAUGHAN MACCAUGHEY and JOSEPH S. EMERSON.

#### LIST OF VARIETIES (Concluded).

156. *MANINI*. This is the name of a brightly striped fish, and the kalo is so called because in the striping of its petioles it resembles this fish. Another explanation is that *nini* refers to anger, especially the "anger of the gods," and that either the fish or the kalo *Manini* could be used to appease the *nini* or anger of the gods when offended. A place formerly famous for its *Manini* kalo was Wahiawa, on Kauai. There are several sub-varieties, all grown in *lo'i*.

157. *MANINI HA KIKOKIKO*. The petioles of this kalo are striped with dark purple. The corm is white within, and resembles *Maka opuo*. It matures in one year, and is good steamed or made into *poi*.

158. *MANINI KAKAU*. *Kakau* means striped or spotted; it is identical with the word *tatu* or *tattoo*. This kalo is planted in *lo'i* or wet places near the edge of the woods. It is well known on Oahu and Maui (Kalihi, Waihee). The corm is very large, and is white within. The leaf blade is large and mottled, the petioles are conspicuously striped with dark purple. This kalo was considered suitable for medicine, and for offering to the gods.

159. *MANINI LAU KIKOKIKO*. Like *Manini hakikokiko* except that the leaf-blade is conspicuously mottled with dark purple.

160. *MANINI ULA*.

161. *MANININI*. No data, save that it is stated that this kalo is not one of the *Manini* group.

162. *MANUA*. This kalo is said to be similar to *Haokea*, save that the leaves and huli are striped.

163. *MAUA MELEMELE*. Corms under this name were sent from Hilo region to the U. S. Department of Agriculture by L. C. Lyman, 1908.

164. *MAUA ULU*. According to Mr. L. C. Lyman, a synonym for *Maua melemele*.

165. *MIMI IOLE*. This kalo is raised in unirrigated fields, particularly in the Hilo region. The corm is long and cylindrical in form; it is white within, of a sticky or gummy consistency, and of

sweet taste. The *poi* is very good. The foliage has no distinctive markings.

On Kauai this peculiar name, which means "rat urine," is not applied to a special variety of *kalo*, but is applied to various *kalos* when they are grown under particular conditions, namely: The wild rats come down to the *kalo* fields, or to patches of wild *kalo*, and carry away some of the smaller corms to their homes in the trees. Here they devour the corms at their leisure, and frequently leave fragments that fall into the crotches or knot holes of the tree, and grow there. So this *kalo* grows epiphytically in the *koa*, *lehua* and other trees, and according to native belief is fertilized by the rats. The varieties *Ahe ulaula* and *Ahe kokeo* have been found growing in this unique manner.

166. MOA. See *Hua moa*.

167. MOIHU.

168. MOI.

169. MOKIHANA. So called from the fragrance of its corm, when cooked. It has the same delicious odor as the *Kai*.

170. MOKOHI. Also called *Makihi*. Raised in *lo'i*, and in unflooded fields. The corm is red within; the *poi* is pink. The leaf-blade is cup-shaped, like *Ipuwai*; it has a reddish tinge. The petiole is dark green, with a conspicuous reddish band at the base like *Piialii*. This *kalo* resembles the *Lehua*, except that *Lehua* corms cannot be eaten as soon as cooked, because of their acidity, but must first be made into *poi*. In the same way the leaves of *Mokohi*, lacking acidity, make excellent *lua'u*, whereas those of *Lehua* do not. *Mokohi* corms mature in one year.

171. NAIO. Grown in upland fields, Kona, Hawaii, and also on Kauai. Corm is light gray within; the petioles are almost black. This *kalo* differs from *Piialii* in the color of the petioles, which in the former are very red, and in the *Naio* are blackish. Matures in one year.

172. NAIOEA. A Kauai *kalo*, now extinct, but formerly cultivated in *loi*. The leaf, petiole, corm and *poi* were all light in color. When cooked the corms possessed the delicious odor of the *Kai*. By some natives this variety is said to be synonymous with *Palaii*.

173. NAIOEA ULAULA. A sub-variety of the *Naioca*, formerly raised on Kauai. The petioles, corms and *poi* of this form were suffused with red or pinkish.

174. NA KALO AOLA O KALALAU. A famous Kauai *kalo*, so called because the native man Aola on one occasion, years ago, took this *kalo* from the *loi* of Kalalau Valley and planted it as a dry-land *kalo* on the upper slopes of Kalalau.

175. NA KALO IKUE.

176. NANA IPUHENE NA KALO.

177. NEENEE. Varietal name in use on Oahu.

178. NIO. Varietal name in use on Oahu.

179. *NOHU*. A kalo raised on Oahu and Kauai in *lo'i*, and in Kau, Hawaii, in dry-land fields. The natives consider this a choice variety. All parts of the plant, including the *poi*, are darkish (*elele*). There is a form of *Nohu* that has light *poi*.

180. *OHE*. Grown in the Hilo region, on Hawaii; not grown on Oahu. Foliage similar to that of *Hu'okea*. Two sub-varieties are recognized by the natives.

181. *OHLKEA*. Corm white within.

182. *OHE ULA'ULA*. Interior of the corm pinkish.

183. *OHA*. A kalo known in South Kona, Hawaii.

184. *OHEHEHE*.

185. *OKAHU KO KAL*. Cultivated in damp places near the woods, not in *lo'i*. The corms are of average size, reddish within. The foliage at maturity becomes suffused with purple; until this stage is reached it is clear green. This kalo was used in place of the squid (*hee*), when the latter could not be obtained, for the propitiation of the gods in the case of broken vows. The *poi* is not good.

186. *OLAA LOA*.

187. *OLENA*.

188. *OPUKAI*. Probably a synonym for *Opukai*.

189. *OPAE ULA*.

190. *OPUKAI*. In Kona, Hawaii, this kalo is raised in unirrigated fields; on Oahu and Kauai it is grown in *lo'i*. The corm is white within. The petiole is striped with dark purple. *Lua'u* of this kalo is considered excellent.

191. *OPULE*.

192. *OWALE*.

193. *OWAU*. A kalo raised on Kauai, particularly at Huleia. It is reported to be similar to the *Kikii* in every respect save the leaf, which is orbicular and smaller than that of the *Kikii*.

194. *OWENE*. This is a wild kalo, growing in open woodlands, and similar regions. It is the smallest of all the kalo and was used only when other food supply failed. It grows easily, requiring but little cultivation, and so is planted in places where thorough cultivation is difficult. The leaf is striped with light and dark. The petiole is not striped. There are several sub-varieties.

195. *OWENE ELELE*. A dark kalo, the petioles, corm and *poi* being grayish or smoky.

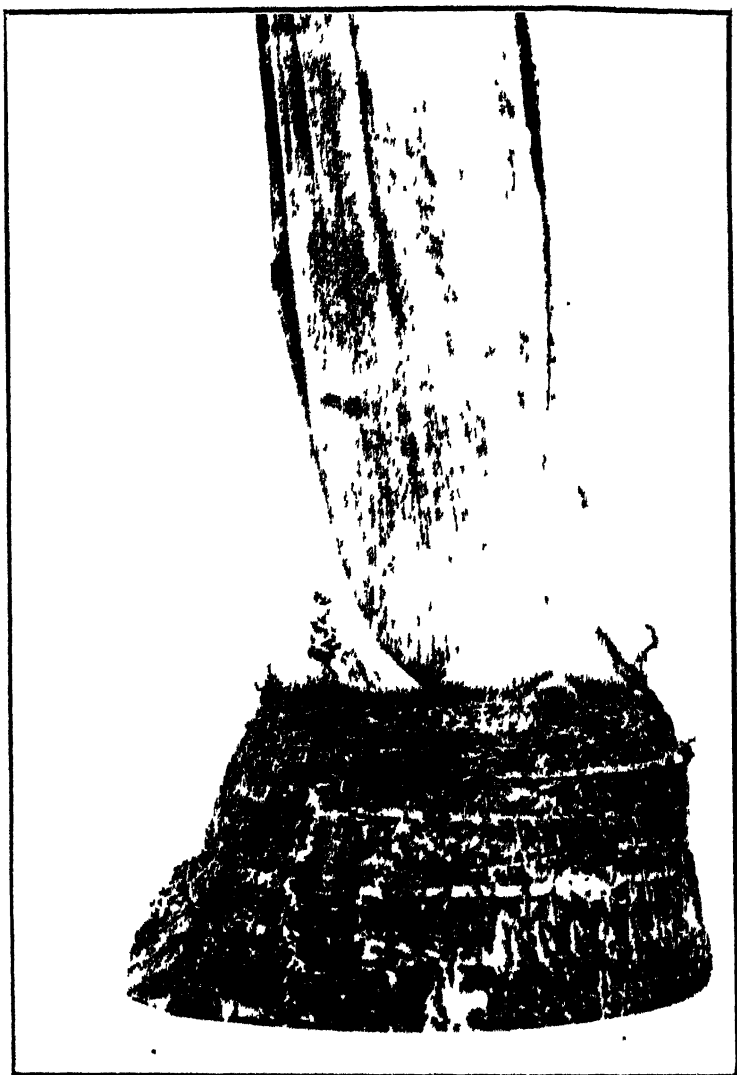
196. *OWENE KEOKEO*. Corm white within.

197. *OWENE LENA'ENA*. The corms and *poi* are yellow.

198. *OWENE MANA*.

199. *OWENE MELEMELE*. Corm small, the size of a turkey's egg; the interior yellow, like the yolk of an egg. Foliage dark green. The *poi* is the same color as breadfruit *poi*.

200. *OWENE ULA'ULA*. Similar to *Owene melemele* except that the petioles are dark purple, and the corms and *poi* are reddish.



#### STRUCTURE OF THE KALO PLANT.

Showing the juncture of petioles with corm. It is from this region that the *huli makua* are cut. Observe the elongated, whitish, horizontal markings. These are petiole scars. Note the axillary buds on many of these scars. From these axillary buds develop the *huli oha*; that is, if the parent corm is permitted to remain in the ground for a sufficient time. In commercial practice the corms are usually pulled before these axillary buds have developed. Note the numerous, short, vertical scars, due to the fissuring of the bark by the peripheral expansion of the corm. Note the fibrous nature of the outer bark. In some varieties these fibers are very conspicuous and form a matting over the bark. Note the sheathing base of the petiole, encircling the one within. This kalo is *Pihali'i ulaula*.

201. PAAKAI. A kalo occurring on Kauai, and in South Kona, Hawaii.

202. PAAKAI MIKOMIKO.

203. PAKKA. A variety resembling *Haokka*, except as to leaf. The leaf-blade of *Pakka* is much smaller than that of *Haokka*, and is concave, catching water (q. v. *Apuvui*).

204. PALA. Also called *Palakea*. Occurs on Kauai.

205. PALAHA. A variety known on Kauai.

206. PALAH. A kalo grown entirely in upland or unirrigated fields. It is best grown on Maui and Hawaii, but occurs also on Kauai. There are several sub-varieties.

207. PALAH ELEELE.

208. PALAH KEA OR KEOKEO.

209. PALAH PONI.

210. PALAH ULAULA.

211. PALA KEA.

212. PALAH ULAULA. Grown about Hilo, Hawaii.

213. PANA.

214. PAPA KOOLE KA WAA.

215. PAPA KOLE KOVE. This kalo is grown at Waiohinu, Hawaii, in unirrigated patches. It closely resembles the *Naioca* (q. v.). The corm is light colored within when raw, but upon cooking becomes reddish.

216. PAPA PUHO. Grown about Hilo, Hawaii.

217. PAPA. A variety grown on Kauai.

218. PAU O HIIAKA.

219. PEU'. A wet-land variety grown on Kauai. The petioles are very dark; the leaves are larger than those of *Lauloa*; otherwise it closely resembles the *Lauloa*.

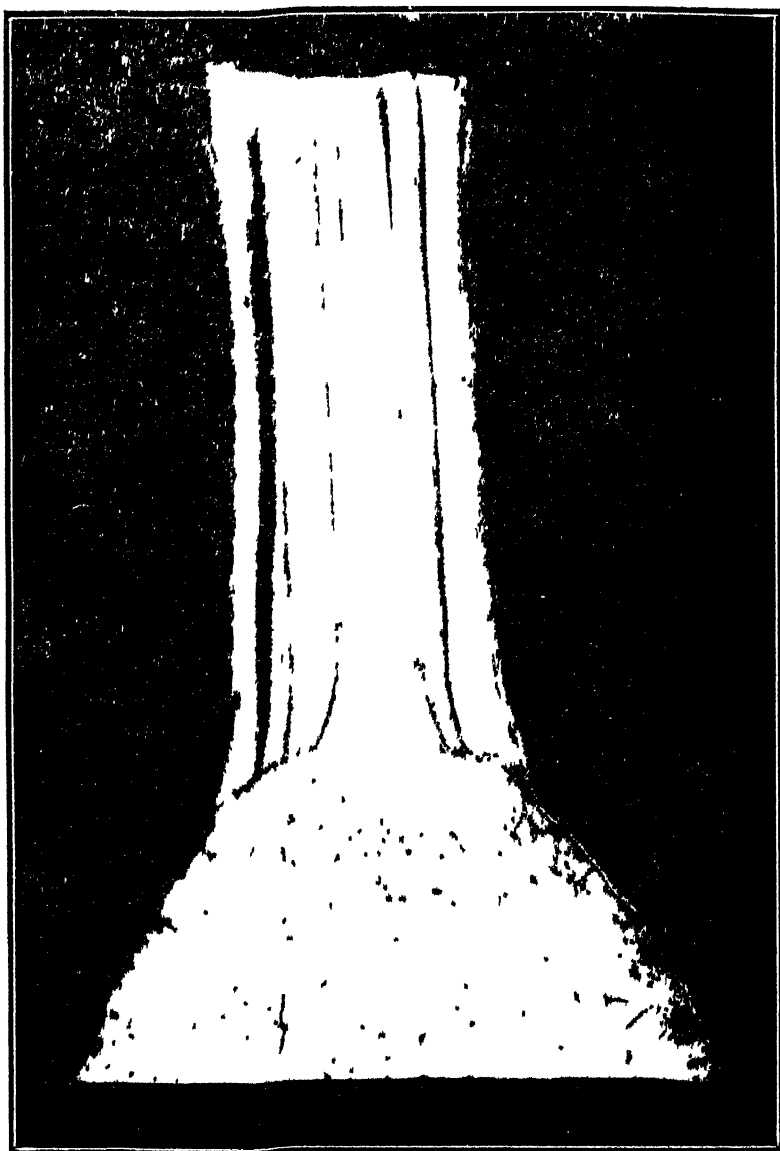
220. PELU HAELE. Varietal name known on Oahu.

221. PIA. Grown in *lo'i* and in unirrigated patches. Corm dark gray within; foliage dark green. A kalo formerly used in religious ceremonies by the *kahunas*.

222. PIPIA. A fragmentary native tradition relates that *Kauhulaan*, a legendary character, had a son who once wrongfully pulled this kalo, and his eyes became bleared (*piapia*), as a punishment from the gods. This kalo is common on all the islands, and is raised in both wet and dry land. The interior of the corm is light gray. The leaf-blade is dark green, with a purple *piko*. The petiole is green, speckled and striped with purplish. The *poi* is good.

223. PIHALALE. No data.

224. PIHALI. A large and well-known group of kalos, raised extensively both by the Hawaiians and Chinese planters. Formerly a favorite kalo for making *poi* for the chiefs. The natives allow 12-14 months for maturity; the Chinese but 8-10, pulling it too soon to give the best *poi*. Some natives distinguish between



### STRUCTURE OF THE KALO PLANT.

Longitudinal median section, showing juncture of petioles with corm. In the corm note: the white, starch containing tissue that forms the bulk of the corm; the numerous latex tubes, which form a conspicuous laticiferous tissue, ramifying all parts of the corm; the thin, corky bark, the outermost layers of which become stringy or fibrous. Note the pithy interior of the petioles, and the central bud, of which an embryonic leaf is visible. This kalo is *Pitcairnia uluala*.

the *Piialii* and the *Naio* by means of the petioles and corms, those of the *Naio* being very red, while those of *Piialii* are less so.

225. *PIALII ELEELE*. The petioles, corms and *poi* are grayish or slaty.

226. *PIALII KEOKEO*. Corms with gray interior.

227. *PIALII MELEMELE*. Corms with yellow interior.

228. *PIALII ULAU'LA*. Corms with pink interior; *poi* pink; leaves suffused with red.

229. *PIKO*. A well-known and extensively planted taro. There are numerous sub-varieties.

230. *PIKO HAO*.

231. *PIKO KEA*. Sometimes wild in the mountains. Raised in *lo'i* and in dry-land fields. Formerly the chief wet-land *kalo* of Kohala, Hawaii, although not raised by the Chinese planters. The natives of Kohala used to plant the *huli* in unirrigated fields for several months (+6), until they attained good size. Then the *huli* were cut and set out in the *lo'i* to form corms. The original corms in the dry-land fields were left undisturbed with the suckers, to form more *huli*. The corms are light gray, of firm texture, requiring considerable labor to pound and mix with water. The corms require 15 months for complete maturity, although they are frequently pulled at 12 months, or sooner. The *poi* is light bluish in color, and is very good. According to some natives, *Pikokea* is synonymous with *Ilapu'u keokeo*.

232. *PIKO NUI*. Grows wild in swampy places; cultivated in both wet and dry land. When grown in wet land, or in swampy places, it attains a height of four feet. The corm is light gray; the *piko* of the leaf-blade is large, and light green; the petiole is dark green, striped with purple.

233. *PIKO A WAKEA*.

234. *PIKO UANA*. So called because of its very extensive root system, which anchors the corm firmly in the mud, and renders the *kalo* difficult to pull (*uana*). Grown in wet and dry land. Corm light gray within.

235. *POHINA*. Varietal name used on Oahu.

236. *PONI*. Cultivated only in *lo'i*. The leaf-blade is very dark green; the outer skin of the petiole is dark (purple). The pigment was extracted by the natives in early times, and used for the dyeing of *kapa*, straw hats, etc. There are several sub-varieties.

237. *PONI ELEELE*. Interior of corm very dark gray.

238. *PONI KEA*. Interior of corm light gray or whitish.

239. *PONI ULAU'LA*. Interior of corm pink or reddish.

240. *PONI ULULU*. A Kauai variety, grown only in *lo'i*. The petioles are dark green.

241. *POPOLO*. Varietal name well known on Oahu.

242. *PUEO*. Cultivated, sometimes wild. Now rare, formerly abundant. The corm is white within, and resembles *Ha'okea*.



The leaf-blade has a wrinkled surface and margin. Because it lacks acidity, the corm was deemed especially suitable for medicine. Matures in 10-12 months. The *poi* and *lua'u* are good. Two sub-varieties are recognized.

243. PUEO HA LENAENA. Petioles distinctly yellowish.

244. PUEO KEOKEO. Petioles clear green.

245. PUHI.

246. PUO KO NANE.

247. PUWALU. Raised in *lo'i* and in dry-land fields. Corm very dark within; foliage very dark green. Formerly a famous *kahuna kalo*.

248. UAHU A PELE. All parts of this *kalo*, and the *poi* made from its corms, have a peculiar smoky or grayish appearance, like "the smoke of Pele," whence the name. On Hawaii it is called *Ualehu*. It grows wild in damp places; it is cultivated in *lo'i* and in unirrigated fields, and does well in either. The corm is dark gray within; is of average size, and matures in one year. The leaf is too tough for *lua'u*; the corm is not considered suitable for medicine, nor for offering to the gods. This *kalo* was formerly raised in Ewa, Oahu, but was abandoned when rice culture became prominent in the region. It is grown at Kalalau, on Kauai.

249. UAHU A PELE ULAULA. As above, save that the corm and *poi* are pink instead of dark gray. The leaf-blade and petiole are suffused with reddish.

250. UAHU OKI. No data.

251. UALEHU. Synonym for *Uahu a Pele*.

252. ULAMAU. A variety well known on Kauai. The petioles, corm and *poi* are pink. In ancient times the petioles of this *kalo* were boiled, in order to extract the pink color, and this dye was used to give a pink tinge to the *poi* made from various *kalos* that were not pink. The pink tinge was associated with excellence and superior flavor, and so this artificial coloring was practiced.

253. ULA NUI. A variety occurring both wild and cultivated on Kauai. The corm and *poi* are reddish. Also called *Ulamani*.

254. ULAIA. A reddish *kalo*, growing wild near Lihue, Kauai. The corm and *poi* are red.

255. ULHI.

256. ULI.

257. UMIUMI. A *kalo* known at Lahaina, Maui.

258. UWAUWAHI.

259. WA'E.

260. WAIANAE.

261. WAIANUENUE. (Water of the rainbow.) A reddish *kalo* occurring on Kauai. All parts are suffused with pink.

262. WELEHU. A *kalo* known at Lahaina, Maui.

263. *WELOWELOLA*. A kalo raised on Kauai in *lo'i*; near Hilo, as a dry-land crop. The petiole is reddish, with two darker stripes; the leaf-blade is unmarked; the corm is white within. The name is fanciful and refers to the red rays of the setting sun.

264. *WEHEWA* or *WEHIWA*. Synonyms for *Wewehiwa*.

265. *WEWEHIWA*. A variety raised in the Hilo region, Hawaii.

266. *WIA*.

In describing the varieties of kalo, the native Hawaiian uses a color terminology that needs translation into English equivalents, and modification to give it the proper botanic significance with reference to kalo. The following terms are commonly used:

1. *Ele-ele*. Intensive of *ele*; dark. To be dark colored, blackish; may be used in connection with any dark color, as very dark green or very dark red.

2. *Ha-kea*. Light colored, not dark, as a light green, or a light yellow; refers to shade or degree rather than to actual pigment.

3. *Ha-lena-lena*. Yellow; yellowish.

4. *Ha-uli-uli*. The intensive of *hauili*; dark, shaded, blackish.

5. *Kaha-kaha*. Marked, striped, streaked.

6. *Koo-keo*. Light colored; light; clear; not dark nor shaded.

7. *Kiko-kiko*. Spotted; speckled; small mottlings.

8. *Mele-mele*. Yellow, amber like; the color of honey; a translucent yellow.

9. *Olena-lena*. Yellow; bright yellow.

10. *Omao-mao*. Green; greenish.

11. *Onio-nio*. Striped; spotted; mottled; with some design or figure, like calico cloth.

12. *Oo-hina-hina*. White; whitish; gray; silvery gray.

13. *Ula-ula*. Reddish; pink or purplish; scarlet.

14. *Uli-uli*. Blue; bluish; bluish-gray; darkish.

In India, China, Japan, and the other countries in which kalo is raised there are many variations, many of which deserve varietal rank. The kalos of the Hawaiian Islands may be divided into four groups:

a. Kalos usually cultivated only in upland, dry-land, or unirrigated regions. Examples: *Elepaio*; *Hoene*; *Icie*; *Naio*.

b. Kalos usually cultivated only in lowlands, wet-lands or irrigated patches (*lo'i*). Examples: *Koae*; *Lau loa onionio*; *Lehua ku i ka wao*; *Puali'i*; *Poni*.

c. Kalos cultivated in both irrigated and unirrigated lands. Examples: *Apu wai*; *Eleele*; *Haehae*; *Ha'okea*; *Oi*; *Ipu-o-lono*; *Owene*.

d. Wild kalos, growing in damp places in or near the forests. Examples: *Ahe*; *Awcoweo*; *Hoolenawao*.

This grouping stands rather for cultural differences, however, than for fundamental distinctions between varieties. It frequently happens that the same variety may be raised in one region as a wet-land crop, and in an adjacent region as a dry-land crop. It is probable that kalo was first grown entirely without irrigation, in lands naturally moist. The evolution of extensive irrigation systems was a later and lengthy agricultural development.

Descriptive data relative to the varieties of kalo have been collected by the authors, through extensive conferences with native Hawaiian kalo planters. This data is necessarily fragmentary, but it is believed to possess intrinsic value.

*(To be continued.)*

### GOVERNMENT REPORTS LOWEST FIRE LOSS.

With the middle of September the fire season on the national forests came practically to an end with less damage than ever recorded. There is always some danger from carelessness of camp or of settlers burning brush and clearing land, but the real danger season extends only from the middle of June until the middle of September.

Forest officers throughout the west are congratulating themselves on a season so markedly free from heavy losses. They feel that the immunity from loss has been due to two principal causes: partly due to a favorable season, but largely to a much better organization for fire protection than has been attained heretofore. The effectiveness of the organization is shown particularly by the fact that while there were in all approximately 2260 fires, as against 2470 last year, yet the area burned so far this year is only about 60,000 acres, as against 230,000 acres in 1912, and 781,000 in 1911. California, Arizona and New Mexico have suffered most during the past season.

The various causes of fires have not changed greatly in their relative proportions. Railroads and lightning head the list, with campers next. There has been, however, a marked decrease in the number of fires caused by burning brush, which, according to the forest officers, indicates a closer coöperation with the settlers in and near the forests and with timberland owners in fire protection and control. It is still true, nevertheless, that a large proportion of all fires started are due to human agencies and may generally be charged against carelessness. Fires caused by lightning are, of course, not preventable, but the system of lookouts by which they may be detected immediately after being set is greatly lessening the loss from this source.

*BOARD MEETING.*

A meeting of the Board of Agriculture and Forestry was held at the board room of the Waterhouse company Thursday afternoon, November 13, being constituted by President W. M. Giffard and Commissioners H. M. von Holt, John M. Dowsett and A. H. Rice.

Reading of minutes included those of a special meeting at which the president was authorized to approve a license of right of way through Nuuanu valley watershed for the lines of the Hawaiian Electric Company.

Reports of divisions were received and filed without discussion.

A report from the forestry committee on various proposed forest reserves, approving them with certain recommendations, was read by the president.

Removal of sheep from Kahoolawe was a subject included in the report, the decision being that Eben P. Low should be allowed until December 31 next to remove the sheep. This recommendation was adopted by the board.

Further time was given to the committee on the modification of Kealia forest reserve on Kauai.

Approval of the Kuliouou forest reserve on Oahu was voted.

*FOREST RIGHTS.*

Correspondence between the president and the attorney general on the question of the right of the military to take firewood from forest reserves as against the rights of homesteaders, was read. Attorney General Thayer rendered an opinion in which he held that homesteaders do not have a prescriptive right to take firewood or other material in government forests, and that the soldiers have no more right than civilians to such privileges, but that the whole matter is under control of the Board of Agriculture and Forestry, which has power to grant licenses for the privileges in question in its discretion.

It was the sense of the meeting on discussion of the question, that the taking of dead wood from the public forests was not necessarily detrimental, and that the granting of privileges should be left with the executive officer.

As, according to Mr. von Holt, firewood on the other side of the island was worth \$12 to \$14 a cord, it was agreed that something should be charged for it, the fixing of price to be in the power of the same officials.

Mr. Hardy, assistant hydrographer of Kauai, was granted leave of absence.

*CALIFORNIA AGRICULTURAL EDUCATION.*

Following are extracts from the report of the College of Agriculture and the Agricultural Experiment Station of the University of California, for the year ended June 30, 1913, showing what is being done with regard to agriculture in the schools of California:

## BOYS AND GIRLS' CLUB WORK.

During the present year boys and girls' clubs have been organized in twenty-six counties. It has not been possible to learn the exact number of clubs or of boys and girls reached through the clubs. The boys and girls' club work may be said to have had its inception at a meeting of the state association of city and county superintendents, at Santa Catalina Island, in August, 1912, though Mr. C. A. Stebbins, connected with the agricultural education division from 1910 to July, 1912, had done some work in the promotion of gardening in elementary schools through an organization known as the "California Junior Gardeners."

A conference was held at Santa Catalina regarding the possibilities in the way of boys and girls' club work for California elementary and grammar schools.

As a result, the advantages of such work were agreed upon, and the advisability of utilizing agricultural and domestic science clubs as a factor in elementary education and as a socializing and educative influence in school communities was made clear. The superintendents were encouraged to start the organization of the clubs in the schools in their respective counties and were informed that the division of agricultural education would be glad to do everything possible to assist them in promoting the work and usefulness of the clubs.

By coöperation between the state and county superintendent of schools, state and county fair officials, and this department there is no doubt that an excellent system of club work can be devised and put in operation. That the results will be worth while seems sure. Wherever boys and girls' club work has been wisely organized throughout a state it has not only proved of value to individual boys and girls and as an aid in agricultural instruction, but it has been an effective and wholesome method of inciting a keener interest in the affairs of scientific agriculture among adults. It has, to a greater or less degree, an inevitable influence upon the work of adult farmers. The father can not help catching some of the enthusiasm of the boy when he sees the value of better farming methods demonstrated to him.

Ease in administration of club work can be secured by making the county the unit for contest work. This will also make possible a variety in the nature of the contests, so that the children can engage in those activities of greatest local importance. The

club work of other states affords many examples of "sufficient incentive" in the way of awards, which we may profit by in developing the work. Trips to the state agricultural college, to the university farm school, to the state fair, or to a boys' or girls' camp, have all proved popular as the highest award for a county. Lesser awards, significant in character, can readily be arranged for winners of local contests. Exhibition of prize products of each club at the county fair, exhibits at the state fair, etc., are legitimate means of popularizing and adding interest to the work.

#### SEED DISTRIBUTION.

As a part of the extension work for schools the seed exchange of previous years was continued through 1912-1913. Miss Jones was in charge of this work and reports a total of 218 seed packets sent out during the year, to twenty different schools. In connection with this work suggestions were made and advice given, where requested, as to the choice of plants and as to planting plans for school grounds, home grounds, etc. Lists of vines suitable for use in different parts of California, a list of plants that grow well in the shade, and a list of drought resistant plants were also prepared in response to inquiries.

#### AGRICULTURE IN CALIFORNIA SCHOOLS.

During the past year agriculture was taught in fifty-one high schools of the state, the courses varying from one to four years in length. In response to letters sent to the fifty-eight county superintendents in the state regarding the present status of agricultural instruction in the elementary and grammar schools, thirty-six replies were received. Six superintendents reported that agriculture was not being taught in their schools, the reasons being that severity of climate or non-agricultural districts naturally eliminated the subject from the schools. One superintendent did not favor the introduction of agriculture in the grammar grades until it could be properly taught, which he did not consider possible under his present conditions and with his present teachers. He thought club and contest work would meet his requirements best for the present. Eleven counties reported that their schools were required to offer agriculture as a subject in the seventh and eighth grades. This work in most instances consisted merely in one or two terms of reading of some prescribed text. In a few counties the course is outlined in the county manual which the teachers are expected to follow more or less closely.

School garden work is reported in twenty-eight counties and it is being given in four or five other counties that did not report.

## CHINESE REPUBLIC STUDIES OUR FOREST METHODS.

David Z. T. Yui, formerly secretary to the vice president of the Chinese Republic, is now traveling in this country to learn modern methods for adoption in China. He is at present in charge of the lecture board of the Chinese Y. M. C. A., which is in close touch with the new government and is aiding in putting into effect an educational campaign for the citizenship of the republic.

While in Washington recently Mr. Yui spent some time investigating the work of the forest service, in order that he might find out whether its organization and methods would be of value to the newly created department of agriculture and forestry in China. In speaking of this part of his work, Mr. Yui said:

"In the matter of forest conservation the United States profited much by looking upon the disasters which were the result of the Chinese neglect of forestry. This was a great warning to you. Now we wish to profit by the improved methods of forestry which the United States has discovered and applied."

### AYRESHIRE RECORD.

Following is a summary of the official Ayreshire record No. 24, issued by the Ayreshire Breeders' Association, Brandon, Vt., of date October 10, 1913:

	Lbs. Milk.	Lbs. Fat.	Lbs. Butter.	%Fat.
Average of mature form is.....	11,161	440.16	518	3.98
Average of four-year-old form is.....	12,630	523.77	617	4.09
Average of three-year-old form is.....	9,471	384.45	452	4.07
Average of two-year-old form is.....	9,071	351.15	413	3.86
Average of the whole, cows and heifers, is	9,940	394.37	464	3.95

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It is estimated that 90,000,000 broom handles are used annually in the United States—one for each man, woman, and child.

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Germany is said to have an oversupply of foresters; so that well-educated men have hard work to secure even inferior positions.

One of the largest forest nurseries in the United States is conducted by the forest service near Haugen, Montana. It is known as the Savenac nursery and has a capacity of 4,000,000 young trees a year.

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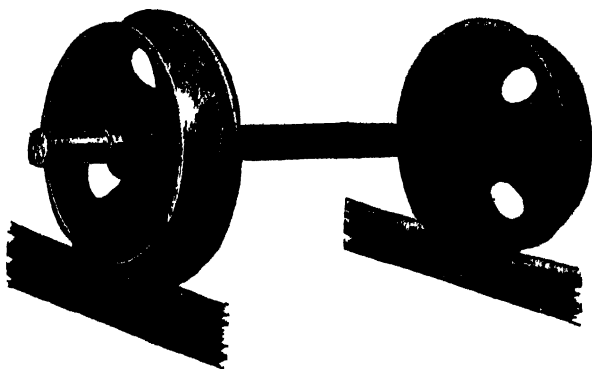
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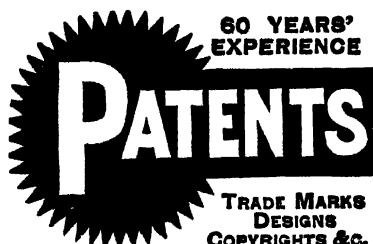
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# THE HAWAIIAN FORESTER AGRICULTURIST

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VOL. X.

DECEMBER, 1913.

No. 12

A news article in this number shows what the College of Hawaii is doing to improve the production of corn in this Territory.

Interest has been renewed in the subject of the commercial growing of coconuts in these Islands by the arrival from San Francisco of a manufacturer, who is in quest of the raw material for some unnamed commodity to be made from the husks of the nuts. This visitor, Mr. Alexander Z. Rothschild, is reported as ready to enter into negotiations with anyone here who will undertake to grow coconuts for a factory that he will start in Honolulu if a supply of the raw material be assured. Although, notwithstanding that there are responsible men here who are interested in coconut growing, it does not appear that anyone has yet been able to get in practical touch with the promoter of the enterprise in question, still it is deemed well to reprint the newspaper account of Mr. Rothschild's advent, which is done on another page. Any real opportunity for starting a profitable new industry in Hawaii should be heralded as widely as possible, and not be allowed to go past unimproved. For some years the Forester has paid no attention to contemporary literature on coconut cultivation, of which much appears in its tropical exchanges, because of the lack of practical interest in the commercial possibilities of the product which has prevailed here. Should, however, the culture be taken up in these Islands upon a businesslike scale, this magazine will be prepared to draw from the experience of other countries with coconut growing, for the benefit of those engaging in the local industry.

Two interesting articles appear in this number under the authorship of Professor Illingworth, of the College of Hawaii. One describes the fruit flies of Fiji, showing how very important it is to keep them out of Hawaii. The other makes the little brown ant out as one of "our good friends," for its services in keeping down the pestiferous house-fly.

Very important information is presented by Mr. G. C. Munro, manager of the Lanai ranch, in this number, relative to kiawe beans and cactus leaves as material for ensilage. Every stock raiser and user in the Territory is interested in this question.

Lands that it would be difficult to put to any other profitable purpose may be utilized for the production of the sources of stock feed mentioned by Mr. Munro. Anything that will reduce the fodder bill of Hawaii, besides increasing the land's capacity for raising stock as ensilage of proved economy and nourishing properties is bound to do, will enhance the general prosperity of the Islands.

All of the divisions of the Board of Agriculture and Forestry make highly interesting reports for November. They are worthy of careful reading and study, and may be commended for such attention to everybody who expects to have anything to do with legislation for the future. There is probably no country, or political subdivision, anywhere which has a more advanced and progressive agricultural and forestry service, in proportion to financial support received, than that of the Territory of Hawaii at the present day.

### FRUIT FLIES OF FIJI.

By J. F. ILLINGWORTH, Ph.D.,

*Professor of Entomology, College of Hawaii, Honolulu, T. H.*

The brief study that I was able to make of the fruit flies of Fiji convinced me of the importance of our quarantine of all vegetable matter, etc., from that region. Since the four species that have been bred out from fruit of those islands all belong to the genus *Dacus*, we can form some idea of their destructiveness. This destructiveness is emphasized since the melon fly (*Dacus cucurbitae*), which was discovered by Mr. Muir to be a native of India, has proved itself such a serious pest here.

The members of this genus all have the same habit of puncturing and depositing their eggs beneath the skin of the fruit. In fruits with a thick rind, like the shaddocks, granadillas, etc., the young maggots are often found for some time in this outer spongy layer; but they eventually work their way in, and destroy all parts of the pulp. As is commonly observed with the melon fly, the maggots have the springing habit, which enables them to escape to some distance from the fruit, before entering the soil to pupate.

It is important to note that, besides the various fruits similarly infested here, the Fijian species attack both pineapples and bananas. If we were so unfortunate as to let these flies get into the Hawaiian Islands, two of our most important crops would receive a serious set-back.

## FIJI FRUIT FLY.

*Dacus passifloriae* Froggatt.

(Proc. Linn. Soc. N. S. Wales, 1911, vol. 35, p. 870.)

This species is a very general feeder, and by far the most abundant of those coming under my observation. I was able to breed them in myriads from shaddocks, granadillas, and guavas. Other citrus fruits—oranges, manderines, lemons, limes, etc.—were but slightly infested.

(Observations of particular interest were made upon the manner in which the larvae avoid the attack of ants. These predaceous insects congregated beneath and around each fallen fruit, ready to pounce upon the maggots as they emerged. In most cases the exit holes of the larvae were made on the upper surface of the fruit, and by springing out a foot or more into space, the maggots were able to get into the soil before the ants reached them. Froggatt's original description follows:

Length 9 mm. Head dull yellow; mouth-parts and antennae darker, terminal joint of latter large; arista long, slender; eyes dark red; a lunate dark blotch above the antennae; front unspotted, dull brown; ocelli enclosed in an angular black blotch. Thorax black, no yellow on shoulders, the large angular nodule area on mesopleura not reaching the dorsal edge, yellow, scutellum narrow convex, dull yellow; double yellow spot forming a blotch on hypopleura. Wings hyaline, nervures chocolate-brown. Legs light yellow, sometimes clouded at apex of femora, tibia and tarsi. Abdomen black, elongate, oval; in the female the basal segment is broadly rounded, with the anal segments and ovipositor turned down right under the basal portion; sheath of ovipositor large, apex yellow.

Chaetotactic characters.—Head: three pairs of bristles on the front, the first pair longest crossing each other at the tips; the third pair below the ocelli shorter; apex with a pair of stout bristles on either side. Thorax: bristles on front margin short, four on either side, with a pair on the dorsal surface above the scutellum, the latter furnished with a pair on the hind margin.

*Hab.*—Fiji (W. W. Froggatt; bred from granadilla fruits); (A. Koebele; bred from mangoes); (T. Kirk, from fruit imported into New Zealand).

## PINEAPPLE FRUIT FLY.

*Dacus (Tephritis) xanthodes* Broun.

(Trans. N. Zeal. Instit., 1904, vol. XXXVII, p. 327.)

The maggots of this species are very similar in habit and appearance to those of the Fiji fruit fly. So much so that, where the two species were found feeding together in shaddocks, I was unable to distinguish between them.

Capt. T. Broun, government entomologist at Auckland, states

in his paper describing the species, that it was first discovered in one pineapple imported from Rarotonga, on the 5th of December, 1903; and on the 14th of that month Mr. G. Harnett, his assistant inspector, and he again detected it in two cases of pineapples from Suva. He also states that it was subsequently found in oranges, granadillas and mammees-apples (papaïas) from Tonga and Rarotonga. He remarks that "this new pest threatens to become as troublesome and injurious as the Queensland fly." Capt. Broun's technical description follows:

*Imago*.—Length of body,  $4\frac{1}{2}$  lines; expanse of wings,  $7\frac{1}{2}$  lines.

*Body* elongate, yellow, occasionally testaceous, extremity of abdomen blackish, head sometimes rufescent, tarsi infusate; on the thorax from base to apex there is a central pale ivory-like streak, along each side there is a similar one; these lines after death become less conspicuous.

*Head* as broad as the thorax, smooth; on its back part there are four black outstanding setae, and between the eyes six finer ones. Antennae normal, their terminal joint elongate and rather darker than the others; at the tip of the preceding one arises a very long seta, which, though stout at its base, becomes very slender and darker towards the extremity. *Eyes* large, prominent, their inner edges straight and moderately distant from each other; they are finely faceted, and of a brilliant purple during life. *Thorax* cylindrical or subovate, nearly twice as long as it is broad, with two slight almost equidistant constrictions at each side; the surface bears numerous minute black granules; from each of these proceeds a fine dark hair; at the base, which is deeply emarginate, there are two long rigid conspicuous black setae directed horizontally backwards; four smaller ones are situated just before the posterior constriction, and about an equal number along each side. *Hind-body* quite the length of the thorax, its basal three segments, irrespective of the narrowed anterior portion of the same length and breadth, thus forming a cylindrical figure fourth segment rather shorter and narrowed behind, the terminal elongate and tapering towards its apex, with very fine grey hairs; the preceding segments are minutely sculptured and bear many dark slender hairs.

*Legs* stout, moderately elongate with short black hairs; posterior tibiae somewhat arcuate. Tarsi elongate pilose, their basal joint rather more than half of their entire length, fifth bilobed; claws black and rather small.

*Halteres* yellow, medially slender, clavate and triangular at the extremity.

*Wings* hyaline, unspotted, with pale-brown nervures corresponding in structure with those of *Tephritis tryoni*.

*Underside* flavescent, not maculate except at the apex of the last ventral segment, which is piceous. The abdominal seg-

ments are concave or so deeply hollowed that the sides and upper surface appear quite thin.

*Male*.—*Hind-body* elongate-oval, terminal segment rounded and not prolonged; on each side of the uncovered second segment there is a small cluster of fine black setae; these do not occur in the other sex.

This species differs from Froggatt's *Tephritis psidii* in being larger, differently colored and sculptured, and without dusky areas on the wings. From *T. tryoni* it is distinguished by the greater length of the body and expanse of the wings, uniform coloration, without fuscous or yellow marks, dissimilar clothing and sculpture, less broadly oviform or wasp-like hind-body, and stouter antennal setae. In *T. tryoni* the flanks of the sternum are fuscous.

THE SOUTH SEA GUAVA FLY.

*Dacus (Tephritis) psidii* Froggatt.

(Agri. Gaz. N. S. Wales, 1899, p. 501, pl. 2, figs. 1-2.)

Froggatt states that the larvae of this species were first found in infested guavas condemned in a shipment from Noumea, New Caledonia. Specimens were later taken in a shipment of granadillas from Fiji. Froggatt's description follows:

This is a medium-sized species, measuring 3 lines in length and about 5 across the expanded wings. The head light-brown, with rich metallic purple eyes; antennae brownish-yellow, the last joint black, long and cylindrical, finely pubescent, the bristle stout and long, with scattered bristles on the face and hind margin of the head; thorax black, with a few fine bristles near the base of the wings, a broad parallel white stripe down the center, with a pale yellow stripe down either side, the humeri a stripe on the sides marked with creamy white; the scutellum large, angular, broadest in front, so broadly margined with creamy white that the center forms a black triangle, a pair of black bristles ornamenting the hind margin; legs brownish-yellow, clothed with fine hairs, tarsal spines and claws black; the wings hyaline, very slightly clouded at the tips; nervures blackish; the transverse cubital nervure clouded on either side with black, giving it a thickened appearance; the apical portion of the second costal, the base of the third costal, and the third basal cell clouded with brown; the abdomen black, elongate, narrow at base, pointed to extremity; the genitalia ochreous; ovipositor consisting of a stout horny pointed process, enclosed in a pale yellow sheath of a granulated structure.

Habitat—New Caledonia and Fiji.

BANANA FRUIT FLY.

*Dacus curvipennis* Froggatt.

(Rept. on Parasitic and Injurious Insects, Dept. of Agric. N. S. Wales, 1909, p. 93.) Also (Farmers' Bull. No. 24, Dept. of

Agric. N. S. Wales, 1909, p. 28.) Mr. Froggatt describes this species as follows:

This is a handsome, dark yellow and black fruit fly, of medium size, with hyaline wings with the costal margin clouded forming a regular narrow band extending round the tip of the wing; a small V-shaped blotch extends downward from the costal stripe clouding either side of the transverse cross nervure between the first posterior and basal cell, with the usual stripe down the inner side of the wing. Length, 6 mm. Head yellow, eyes purplish-black, antennae fuscous at the tips, bristles black, without black spots on the face; thorax, with the whole of the dorsal surface, covered with a dark shield-shaped black patch, with the center covered with an elongate double bar of silvery white; the shoulders, sides of the body, and scutellum bright yellow, a narrow band or short bar of the same color on the sides of the thorax; the scutellum somewhat elongated when viewed from behind, more convex when viewed from above, with two bristles at the hind margin; a few scattered bristles on the hind margin of the head and the sides of the thorax; legs yellow, thighs of hind legs and tarsi darker; abdomen elongate, with the base and two narrow transverse black bands below, the second broadest on the sides; sheath and ovipositor elongated.

Habitat—Fiji. Bred in Sydney from larvae taken from bananas in shipments of fruit from Suva. Several specimens of both sexes. Type in Agricultural Department's collection, New South Wales.

### LITTLE BROWN ANT DOING GOOD WORK IN HAWAII.

By PROF. J. F. ILLINGWORTH, Ph.D.,

*Professor of Entomology, College of Hawaii, Honolulu, T. H.*

Investigations at the College of Hawaii indicate that the little brown ant (*Pheidole megacephala*) is the principal factor holding house-flies in check under our tropical conditions. It is roughly estimated that fully 75% of the flies are destroyed. I first called attention to the value of this ant as a destroyer of house-flies while carrying on investigations in the Fiji Islands during the past summer.

The remarkable scarcity of house-flies in Fiji indicated that something was effectively destroying them. With all the open refuse-pits which prevail there, one would naturally conclude that these flies would multiply in hordes. In fact, if nothing held them in check in a country with the climatic conditions of Fiji, they would become so abundant that humans would not be able to exist. Recognizing this fact, I suspected that some parasite was preying upon them and began a series of experiments

to discover it. The refuse-pits were found to be very free from maggots, much to my surprise, and later I discovered that this was due to the fact that the little brown ants got most of the eggs and larvae of the flies almost as soon as they were produced. The eggs and newly-hatched maggots of the house-fly are very small, but by very close observation I was able to see the ants carrying them off in myriads. I also found that the ants even attack and destroy the full-grown maggots whenever they appear on the surface of the manure.

In one experiment 200 newly-emerged adult flies were entirely destroyed by the ants, which accidentally found their way into the breeding cage. The attack was only discovered after most of the flies had been dismembered. A few were still in the toils with six or eight ants holding them by wings and legs while others proceeded to cut them to pieces. All of the fragments were finally carried away to the nests of the ants.

While this species of ant is not so abundant here as in Fiji, it is gratifying to know that they have the same fondness for an insect diet. House-flies being one of man's worst enemies, coming from filth on to his food and spreading all sorts of contagion, people in tropical countries are particularly fortunate in having such a check upon their spread. Though the little brown ants are often a nuisance by getting into things which are unprotected, we must give them credit for the good work that they do for us.

As is well known here, ants can easily be kept out of cupboards, etc., by surrounding the legs with tapes wet in an alcoholic solution of corrosive sublimate. This treatment remains effective for a long time unless the tapes become wet or dusted over.

### THE KALO IN HAWAII (VI).

By VAUGHAN MACCAUGHEY and JOSEPH S. EMERSON.

#### THE CULTURAL REQUIREMENTS OF KALO.

The cultivation of kalo is limited to frostless regions. The corn requires in most cases a full year to mature. Cold weather during that period would be disastrous. As examples of kalos which mature rapidly we may mention the *Apuwai*, the *Mahahā*, and the *Piko-o-wakea*. In Olowalu, Maui, the strong winds often ruin the growth of the kalo, which has to be pulled before completing its maturity. For this reason the *Apuwai* is preferred, because it gives a good corn in six months. The *Piko-o-wakea* can also be pulled in six months. In Ewa, Oahu, the *Mahahā* is pulled in five months. In all these cases a more perfect development would be secured by allowing a longer time for growth, but where haste is required the time is not given. The *ohā* or lateral



offspring are always wanting when the corn is pulled too soon. The Chinese commonly pull kalo much earlier than the natives do. As an example of a slow growing kalo we may mention the *Ha'okea*, a wet-land variety which requires from 12 to 16 months to fully develop. If left in the ground a longer time it rots and is unfit to eat.

The climate of Hawaii has many characteristic peculiarities, some of which, as suggested above, directly affect kalo culture. The climate, in general, is distinctly sub-tropic. Cool trade winds and ocean currents reduce the temperature about ten degrees below that of any other part of the world in the same latitude. The prevailing wind is the northeast trade, which blows on an average 260 days in the year.

At ordinary altitudes the maximum summer temperature is rarely above 85° F., and the minimum winter temperature never descends below 50° F. The daily range of temperature averages 13°, seldom exceeding 20°. The average annual temperature for Honolulu is 74°. The highest mountains (8000 to 14,000 feet) are sometimes snowcapped. Cloudiness, rainfall, wind and humidity vary according to situation in relation to the mountain ranges and to altitude. In general there are no sudden changes of temperature, and very slight and seasonal changes. The climate is a warm, bright monotone, without frost, "northers," thunderstorms, hurricanes, or cyclones. The contrast is striking between this equable condition and the bizarre vagaries of the eastern states' weather. "At ordinary elevations the inhabitants of the Territory live practically in the open air the year round, since it is almost never necessary to close windows or seek protection against the weather, except for occasional showers."—Newell.

Considering the small area of the Territory, the variation in rainfall is remarkable. Each island has a windward, cooler, rainy side, where the annual rainfall may amount to 250 inches or over; and a leeward, warmer, arid side, where the annual rainfall may not exceed two or three inches. These figures indicate the extremes, however, and frequent light, local showers are typical of the Hawaiian climate. The average relative humidity is 78%, which is low for the tropics.

"It is popularly supposed that the islands are saturated with moisture. This is because of the fact that at certain points, notably on the windward side, the precipitation is exceeding heavy. \* \* \* Over one-third of the entire land surface of the islands is arid for the greater part of the year. Taking into consideration only the areas which possess a soil of agricultural value, it may be said that one-half of all the good soils of the islands require the artificial application of water to be of the highest value in crop production. Much of the lands now used for grazing can be utilized for crops if water can be had."—Newell.

Two other conditions make irrigation necessary in regions

which do not have a high average monthly rainfall—the physical condition of the soil, which in many places is naturally quite porous; and the high slope of the farm lands, on many plantations averaging 500 feet per mile.

Upland or unirrigated kalo demands at least fifty inches of rain, distributed with fair uniformity throughout the year. Because of this requirement kalo cannot be raised on the leeward slopes of the islands, below 1000 feet elevation, without irrigation. On the windward sides of the larger islands it can be grown, without irrigation, from sea level up to 1500 feet. On many parts of the islands above 1500 feet elevation, the growth is considerably slower, because of the low and variable temperature. Above 4000 feet kalo raising is not practicable.

Necessarily, in order to produce heavy yields per acre, the soil must be very rich. For wet-land cultivation the soil must be capable of being puddled, so that it will hold without seepage the water which is flooded over the field during the greater part of the growing season. According to the natives, regions that are abounding with springs are not suitable for kalo culture, except for the raising of certain wild or inferior varieties.

The soils of Hawaii are composed almost wholly of disintegrated lava rock, and are of recent geologic origin. In the valleys and wooded regions there is a small amount of humus; along certain shores there are lowland plains of coral origin; but aside from these there is no other soil but that derived from lava. In many places one can observe with striking clearness the various stages in the decay of the original lava-flows. As a rule the soils are very deep, this resulting from either decomposition in situ, or long-continued washing from higher levels.

There are three important soil-classes,—lava, tufa, and sedimentary. Under normal climatic conditions the weathering of lava, which contains an exceptionally high percentage of iron, produces a heavy, fertile, *dark-red* soil. Soils of this character usually occur on the leeward slopes of the islands. In regions of heavy rainfall (the windward slopes are thus), incomplete oxidation of the iron compounds in the basalt gives *grayish-yellow* soils. These are usually not as fertile as the red soils, because the excessive rainfall leaches out much of the soluble plant-food.

Tufa, or tuff, has a common source with the basaltic lavas, but differs from them decidedly in many particulars, due to its violent ejection thru the action of steam and gases. Tufa soils are *light-red* or *yellowish*, friable and very porous, and not especially fertile. The sedimentary soils, mentioned above, sometimes contain sufficient humus to be decidedly dark in color. These are the typical "taro-patch" soils, and are used for taro, rice and banana plantations.

All of these soils differ markedly from the usual mainland agricultural soils, and demand special treatment. Physically they

are characterized by a high percentage of exceedingly fine granules; in some places this fineness comparing with that of precipitated chalk, being an almost impalpable powder. The more granular types are known as "shotty soils." Most of the soils become quite sticky when wet, but readily disintegrate upon drying.

Iron and manganese are often so abundant that the soil containing them resembles a low-grade ore in composition. In general the soils are characteristically acid, with high percentages of iron (15%-60%), and nitrogen. The average nitrogen content exceeds 0.3%, or six tons per acre-foot. Most of the soils are also rich in phosphoric acid and potash, but these are not always in available forms. The soils are, in general, exceedingly fertile, due partly to the abundant store of plant-food in them, and to the relatively short period in which they have been subjected to leaching.

Hawaiian soils respond quickly to the application of fertilizers, and like all other new soils improve rapidly under rational cultivation. Many of the soils are deficient in lime, but this is easily supplied in the form of coral sand, an excellent form for soil improvement. Dr. Wilcox, special agent in charge of the Federal Experiment Station in Honolulu, says: "When plowed deeply our soils are exceedingly retentive of moisture, as evidenced by the fact that cotton and various other plants thrive in a wind condition where no rain falls except once or twice per year, and then only to the extent of one or two inches. Moreover, good crops of alfalfa and forty bushels of corn per year have been produced with two inches of rainfall without irrigation. One of the most important points in soil cultivation, which has been demonstrated by the sugar planters, is the great value of deep plowing. Some of our soils are commonly plowed to a depth of two or three feet, and are thus put in condition to hold and store the rainfall, for the benefit of the crop. The soils are easily kept in good tilth and great fertility by deep plowing, suitable crop rotation, and the application of fertilizers to replace special elements of plant-food removed by the crops."

The desirable conditions, specified above, find their best and most complete development, in Hawaii, in valley floors or bottoms. The mouths of the valleys are especially adapted to kalo farming. There the valleys widen, giving broad stretches of low-lying land. The kalo lands in such valleys as Manoa and Kalihi, on Oahu, have doubtless been cultivated continuously for a period of several hundred years. In former times the *loi* were situated chiefly in the middle and upper portions of the valleys. "The development of artesian wells on Oahu in 1879," according to Sedgwick, "made it possible to throw open greater lowland areas to taro culture." As a matter of fact, this land was utilized mainly for rice. This soil is fertile mountain wash, fine textured and very deep.

The Hawaiian designated by the word *au* all places where *kalo* is cultivated, and by *kaha* those places where *kalo* was not or could not be grown, the people of such a region depending upon another place. For example, the natives in Kona formerly shipped *pa'i-ai* to the barren region extending from Kailua northward to Kohala. In this region *kalo* could not easily be raised, and the locality was known as *Kekaha*. There were, however, excellent fishing places along the *Kekaha* coast, so the natives of *Kekaha* bartered fish in exchange for the Kona *pa'i-ai*. In connection with this traffic there arose the remarkable story of *Ka-ai-pa'i*, a mythical shark god. This monster lived in the sea near Kona, and any person guilty of *hewa* (non-fulfillment of sacred vows), sailing along the Kona coast, was in great danger of having his canoe, laden with food, overturned by the angered shark-god, who would consume the *pa'i-ai* of the offender.

*Kalo* seems to be able to resist a certain amount of exposure to sea breezes, for it may be seen growing unharmed in places where sugar cane is injured by the salt wind-driven spray.

(*To be continued.*)

## TWO GOOD ENSILAGE MATERIALS.

*To the Editor of the Hawaiian Forester and Agriculturist.*

Dear Sir:—It may interest some of your readers, especially ranchers in dry sections, to know that the *kiawe* bean cures well as ensilage. The seeds are softened in the process and become readily available as food. In this way the beans can be stored for years with no danger of deterioration from weevils eating out the seed, and so destroying a large proportion of the food value, as happens with dry-stored beans.

The cured bean is readily eaten by stock. The trial in this instance was made with a limited amount of beans buried in a grass ensilage pit, and, as the beans cured well and the other material did not, it is evident that the beans would cure well alone.

The common spiny cactus also cured well in alternate layers with grass and weeds. Perhaps too watery to cure well by itself, its juices helped to cure the surrounding material, which in this instance was in too dry condition for good ensilage. The cactus slabs press out thin, and the thorns almost disappear, and it has been found in Australia that stock eat it as they do other ensilage.

Immense quantities of this class of ensilage could be preserved in pits on some Hawaiian ranches, at a moderate cost, during a run of wet years, and much reduce the losses of stock in drought seasons.

With the present prospect of profit in producing beef, anything that will increase the carrying capacity of the land is of value.

Yours truly,  
G. C. MUNRO.

Lanai, December 12, 1913.

## DIVISION OF ANIMAL INDUSTRY.

Honolulu, November 30, 1913.

Hon. W. M. Giffard,  
President, Board of Agriculture and Forestry.

Dear Sir:—Reporting on the work of the Division of Animal Industry for the past month, I beg to say that the fourth annual test of the dairy cattle of the City and County of Honolulu has been finished, a detailed account of the same being submitted in the appended report of the assistant territorial veterinarian.

From this it will be seen that while it cannot be claimed that bovine tuberculosis has been entirely eradicated, it must be granted that the infection has been reduced to a minimum unattained in any other community of similar size and composition, and during the comparatively short period of four years. In certain sections of Europe, notably in Denmark, bovine tuberculosis has been eradicated in a number of counties or communities by means of the Bang method, so named after its originator, Prof. B. Bang of the Royal Veterinary College of Copenhagen, and which consists in the absolute segregation, on the same farm, of healthy from tuberculous (reacting) animals, only those clinically affected being destroyed, the apparently sound reactors being continued for dairy and breeding purposes until they develop clinical symptoms or until the milk is proved to contain tubercle bacilli. In the meantime the milk from the reacting animals is carefully pasteurized, whether for human consumption as milk, butter or cheese, or for the raising of the calves, the latter being removed from their mothers immediately after birth. This method is exceedingly slow and very expensive as it requires the establishment of two entirely separate dairies, as well as separate dairy attendants, and can only be applied to advantage where the question is to preserve a valuable breed or strain of dairy cattle which could not otherwise be replaced. In some cases it has taken from 15 to 20 years to rid a large estate of the disease, the infection, in spite of every precaution, being transmitted repeatedly from the diseased to the healthy herd. It will therefore be seen that while the method obviates the immediate destruction of all reactors, it is so expensive and so uncertain as to be resorted to only in the case of valuable animals, or families, which perhaps have been developed only by means of careful selection and systematic breeding through numerous generations.

The only other case available for comparison is that of the District of Columbia, where the federal Bureau of Animal Industry, in 1909, decided to investigate the prevalence of bovine tuberculosis for the purpose of demonstrating the feasibility of the control and, ultimately, the eradication of the disease from a given territory. To quote from the Year Book of the Department of Agriculture for 1912, referring to the above mentioned case, we read:

"In the first complete testing of the district cattle a total of 1701 cattle were tested, of which 321, or 18.37 per cent., were tuberculous. A systematic retesting has reduced the percentage to 1.29, and in the meantime the testing of cattle entering from other states has prevented the introduction of diseased animals."

And in another place we read:

"These tests were applied only to cattle whose owners signed an agreement with the Bureau providing for the slaughter or effective quarantine of reactors, the tuberculin testing of animals added to the herd, the disinfection of infected premises, and the observation of proper sanitary measures. This work has grown in popularity until in 1912 cattle tested numbered 8433, of which 769 were reactors or suspects. The percentage of tuberculosis now being found by retests in this territory has thus far been reduced to 2.30 per cent."

As compared with these results it must be granted that the reduction in number of infected herds in the City and County of Honolulu from more than 90 per cent. to less than 2 per cent., and of infected animals from 23.98 per cent. to 2.5 per cent., is very creditable, especially when it is considered that the District of Columbia work was performed under ideal conditions, not less than six veterinarians being employed in the testing and the owners being indemnified to within twelve dollars of the appraised value of the reacting animals. The cost to the Bureau of the first test alone, occupying a period of a little more than four months, amounted to \$9270.05, divided as follows:

Salaries . . . . .	\$3275.00
Travel . . . . .	615.48
Hypodermic syringes, etc. . . . .	95.01
Total expenses, testing and tagging. . . . .	\$3985.49
Cost to Bureau of reimbursing owners. . . . .	4264.02
Salaries and traveling expenses in connection with disinfection of premises. . . . .	1020.54
Total expenses to Bureau. . . . .	\$9270.05

Leaving out the cost of indemnifying the owners we find that the testing of 1701 animals on 356 premises, of which 319 cattle were found to react, on 102 premises, all of which were disinfected, the cost of the work done amounts to \$5006.03 or very closely to \$3 per head. These are, as stated, the figures obtained from the Year Book of the Department of Agriculture for the years 1910 and 1912. Let us compare them with the approximate figures for testing the dairy herds in the City and County of Honolulu for the period of 1910-1913, inclusive.

To determine exactly what part of the official working hours and, consequently, what part of the salaries of the officers and employees of the Division of Animal Industry of the Board should

be accredited to this specific branch of work is rather difficult, but it is safe to say that, while the first test (1910), during which the old subcutaneous method was employed, the territorial veterinarian gave much of his time to the work while it lasted (3 months), the subsequent tests have been performed by the assistant territorial veterinarian with a livestock inspector, or, later on, with the municipal milk inspector assisting him, at the outermost one-quarter of the time of the territorial veterinarian and one-third of the time of the assistant territorial veterinarian can possibly be charged against this work. To this should be added the entire time of the livestock inspector while the testing was in progress (Mr. Vanhuisen during the 1910 test, his time being otherwise given to the control and eradication of glanders, and later on Mr. Richards, who, as municipal milk inspector, was assigned to assist in the testing, his salary being paid by the Board of Supervisors up to February 1, 1913), from which we reach the following figures, *for the past four years*:

*Salaries—*

Territorial veterinarian, one-fourth of each year	\$3000....	\$3000
Assistant Ter. veterinarian, one-fourth for 1911	\$1800....	450
Assistant Ter. veterinarian, one-third for 1912	\$2100.....	700
Assistant Ter. veterinarian, one-third for 1913	\$2400.....	800
Livestock inspector, Vanhuisen.....		400
Livestock inspector, Richards.....		600

Total salaries .....\$5950

*Transportation—*

Automobile, deterioration (50 per cent.).....	\$1100
Automobile repairs, tires, gasoline, oil.....	2000

Total . . . . . 3100

*Incidentals—*

Traveling expenses, tags, hypodermic syringes, thermometers, etc. ....	600
--	-----

Grand total .....\$9650

With the expenditure of this sum more than 17,000 tuberculin tests have been applied, making the average cost a little less than 37 cents per test, while at the same time nearly 1100 head of tuberculous animals have been eliminated from the dairy herds of Honolulu, all of which, with the exception of a small number now awaiting slaughter, have been killed.

This means that to our knowledge there are today no untested nor any reacting animals producing milk for human consumption in the City and County of Honolulu. The few, less than thirty head, of reactors still alive are effectively segregated and all branded, the latter preventing the sale or other disposition for any purpose except immediate slaughter. What is left to be de-

sired, however, is the effective disinfection of all infected premises, to accomplish which it will be necessary to obtain the coöperation of the territorial Board of Health. This will undoubtedly be granted if application is made through the proper channels. In the meantime it is not to be concluded that bovine tuberculosis is eradicated or that there is so little left as to make it a negligible quantity. The work must be continued for at least two or three years more, if not longer, and no permit to sell milk should be granted without an official guaranty that no untested or reacting animals more than six months old, remain on the dairy premises or their immediate surroundings. In this connection it should be borne in mind that the local milk producers have voluntarily sacrificed more than 1100 head of dairy cattle, without protest and without any claim for indemnification, even though the last legislature recognized the right of the owners of banana plants to indemnification when the same were destroyed for the good of the community. It would, therefore, seem unwise at the present time to make any change in the regulations now in force and which assure the milk producers of the tuberculin testing of their cattle free of cost, while the health of all dairy animals should be made a matter of official recognition and supervision, not alone as regards tuberculosis but every other disease or ailment which in any way might influence or reduce the wholesomeness of the milk. This would mean granting the dairymen the right to call an official veterinarian whenever anything was the matter with any of his milk producing cows, free of cost, but on condition that he agrees to follow the veterinarian's instructions in regard to the disposition of the milk from the sick animal. The dairyman should, in fact, be encouraged to watch and promote the health of his animals instead of, as proposed, making it a compulsory matter of expense to obtain professional advice when told to do so by an unprofessional officer or inspector. In conclusion I beg again to call the Board's attention to the recommendations of the Milk Committee of 1910, to wit: "That the control of milk be taken from the municipality and be given to the territorial Board of Agriculture and Forestry in order to secure protection for the entire Territory;" and that of the Sanitary Commission of 1911, to wit: "That a heavy fine be imposed on any person convicted of selling milk from cows infected with tuberculosis."

Very respectfully,

VICTOR A. NORGAARD,  
Territorial Veterinarian.



## REPORT OF ASSISTANT TERRITORIAL VETERINARIAN.

Honolulu, November 30, 1913.

Dr. V. A. Norgaard, Chief of Division of Animal Industry.

Sir:—I beg to submit herewith a report on the work accomplished during the month of November, 1913.

*Tuberculosis Control.*

During the past month 1267 head of cattle were subjected to the test with the result that 1256 head of cattle were passed and 11 condemned and branded. With the exception of 35 head, which will be tested on Saturday, December 6, the fourth annual test of the dairies of the City and County of Honolulu is complete. The following tabulated list gives the names of the dairies with the number of cows tested, passed and condemned in each:

<i>Dairy.</i>	<i>Tested.</i>	<i>Passed.</i>	<i>Condemned.</i>
P. M. Pond.....	380	370	10
M. M. Pedro.....	34	34	0
R. A. Branco.....	20	20	0
Waialae Dairy .....	571	558	13
K. Inouye .....	14	14	0
T. F. Farm.....	73	68	5
M. Riedell .....	9	9	0
Kawaiahao Seminary .....	18	18	0
Oahu College .....	15	15	0
Geo. Wond .....	33	33	0
J. M. Whitney.....	13	12	1
P. Miyakawa .....	15	15	0
F. Medeiros .....	20	20	0
F. Andrade .....	94	94	0
H. E. Cooper.....	19	19	0
I. Naoaki .....	22	21	1
J. H. Cummings.....	7	7	0
S. T. Grace.....	7	7	0
C. K. Quinn.....	5	5	0
M. Kawamura .....	5	5	0
M. K. Young.....	15	15	0
S. Tsumoto .....	10	10	0
M. Quintal .....	5	5	0
M. Robinson .....	6	6	0
Nishimoto .....	10	10	0
D. Tello .....	2	2	0
Kamehameha Schools .....	40	39	1
C. J. Day.....	3	3	0
F. Correa .....	13	13	0
J. Mendonca .....	14	14	0

<i>Dairy.</i>	<i>Tested.</i>	<i>Passed.</i>	<i>Condemned.</i>
Geo. Holt .....	38	34	4
S. I. Shaw.....	22	22	0
Alex. Young Dairy.....	39	35	4
R. Davison .....	4	4	0
S. M. Damon.....	343	337	6
I. Moriako .....	16	15	1
S. Boyama .....	9	9	0
T. Nakamura .....	4	4	0
W. E. Wall.....	14	13	1
C. Bellina .....	230	208	22
E. C. Smith.....	8	8	0
F. Johnson .....	7	7	0
S. Tado .....	10	10	0
J. Schwank .....	7	7	0
J. Gouveia .....	50	49	1
O. R. & L. Co.....	1428	1416	12
Waialeale School .....	43	43	0
Laie Plantation .....	21	21	0
Salvation Army Home.....	4	4	0
S. Isuda .....	7	7	0
Waianae Plantation .....	130	122	8
W. P. Louis.....	14	14	0
W. P. Alexander.....	5	5	0
Chas. Frazier .....	3	3	0
R. Compos .....	83	76	7
C. Lucas .....	85	78	7
Jose Gonzalles .....	35	33	2
Frank Gomes .....	47	47	0
K. Yamashita .....	17	17	0
S. Niarato .....	20	20	0
College of Hawaii.....	19	17	2
F. Paepke .....	5	5	0
Y. Ogawa .....	5	5	0
J. A. Templeton.....	39	39	0
Waimanalo Plantation .....	23	23	0
J. Fernandez .....	8	8	0
J. W. McGuire.....	20	19	1
Fred L. Makino.....	3	2	1
Lunalilo Home .....	15	15	0
Carl Waldeyer .....	4	4	0
B. Salina .....	30	28	2
	4406	4294	112

From the above tabulated list it will be seen that 71 dairies have been visited and a total of 4406 head of dairy cattle subjected to the tuberculin test with the result that 4294 head have been passed and tagged and 112 condemned and branded, giving

a percentage of 2.5% of tuberculous cattle which have been eliminated from the dairy herds.

### *Importations of Livestock.*

Nov. 3—S. S. China, Orient: 1 black Chow pup, McDuffie.

Nov. 4—S. S. Honolulu, San Francisco: 1 Dutch belted bull, 1 Dutch belted cow, 2 Dutch belted heifers, Mrs. B. H. Allen; 1 Boston bull pup, Mrs. McWayne; 1 cat, 22 crates poultry.

Nov. 5—S. S. Niagara, Colonies: 4 ponies, 9 dogs, 4 monkeys, 1 cat, Chas. W. Schepp, vaudeville show. (Clean bill of health from Colonial authorities covering six months quarantine and so were allowed entrance here free from restrictions.)

Nov. 5—S. S. Shinyo Maru, San Francisco: 1 dog (quarantined 19 days). Van Vetter.

Nov. 6—S. S. Chiyo Maru, Orient: 1 crate Japanese games, S. de Freest.

Nov. 10—S. S. Sierra, San Francisco: 20 crates poultry.

Nov. 18—S. S. Lurline, San Francisco: 5 black Percheron horses, A. W. Carter; 1 horse, Lieut. A. K. B. Lyman; 7 Berkshire hogs, Club Stables; 35 crates poultry, 1 dog, J. H. Meyers, Kilauea, Kauai.

Nov. 24—S. S. Sonoma, San Francisco: 1 collie dog, Father Chas. Windels.

Nov. 25—S. S. Wilhelmina, San Francisco: 29 crates poultry, 1 dog, W. F. Heilbron.

Respectfully submitted,

LEONARD N. CASE,  
Assistant Territorial Veterinarian.

### DIVISION OF ENTOMOLOGY.

Honolulu, November 30, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I respectfully submit my report of the work of the Division of Entomology for the month of November, as follows:

During the month 37 vessels arrived at the Port of Honolulu, of which 25 carried vegetable matter and one vessel moulding sand.

<i>Disposal</i>	<i>Lots</i>	<i>Parcels</i>
Passed as free from pests.....	392	24,739
Fumigated . . . . .	11	36
Burned . . . . .	63	75
Total inspected . . . . .	466	24,850

Of these shipments 24,587 packages arrived by freight, 127 packages by mail and 136 packages as baggage of passengers and immigrants.

### *Rice.*

During the month 24,321 bags of rice arrived from Japan, all of which was marked "new crop" and all of which was found free from pests and was released for delivery.

### *Pests Intercepted.*

Sixty-six packages of fruit and 8 packages of vegetables were found in the baggage of passengers and immigrants from foreign countries. These were as usual seized and destroyed by burning. Among these were found two lots of chestnuts from Yokohama infested with the chestnut weevil (*Balanus species*).

A potted plant (*Ardisia crenulata*) was badly infested with the brown scale (*Coccus hemisphaericum*). Five boxes of Florida oranges arrived via Seattle which were badly infested with our common purple scale. The oranges had been fumigated as all of the scale was dead. I notified the shippers about the condition of the fruit and advised them not to ship any more in such condition to the Territory.

An *Anomala* grub was found in soil around the roots of an azalea plant in a plant shipment from Japan.

### *Hilo Inspection.*

Brother M. Newell at Hilo reports the arrival of six steamers during the month. Of these five carried vegetable matter consisting of 251 lots and 4172 packages. One hundred and eighty-eight boxes of apples, bearing no label and infested with codlingmoth—in fact most inferior stuff—were returned to the Coast. The Japanese steamer Sayo Maru called at Hilo on its way to South American ports and unloaded 6457 bags of rice and 110 bags of beans, all of which were found free from pests and passed.

### *Inter-Island Inspection.*

During the month of November 51 steamers were attended to and the following shipments were passed:

Plants . . . . .	118 pkgs.
Taro . . . . .	929 bags
Taro tops . . . . .	143 "
Pineapple suckers . . . . .	364 "
Fruit . . . . .	20 pkgs.
Vegetables . . . . .	39 "

. Total passed . . . . . 1613 pkgs.

The following packages were refused shipment—infested with pests and soil attached to roots:

Plants . . . . .	10 pkgs.
Fruit . . . . .	6 "
Vegetables . . . . .	1 "
<hr/>	
Total refused . . . . .	17 "

Respectfully submitted,

E. M. EHRHORN,  
Superintendent of Entomology.

## DIVISION OF FORESTRY.

Honolulu, November 29, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—I have the honor to submit as follows, the routine report of the Division of Forestry for the month of November, 1913:

During the early part of the month I prepared for the use of the Board a comprehensive report on forest conditions on the Island of Hawaii, in part the result of a trip made during October. During November I have also got ready several statements and memoranda dealing with forest work, for reference by members of the Board.

### *Visit to Waialua.*

On November 5, I made a general inspection of the tree planting work now in progress on Waialua plantation, Oahu, visiting, in company with the manager, Mr. W. W. Goodale, the various groves and blocks of trees that have been set out within the past few years. The use of rough or waste land for tree planting is without any question good business. What has been done at Waialua is a good example of what should be practiced on similar land all over the Territory. When the price of imported timbers goes up and even fuel wood gets scarcer than it is today, those corporations that have areas of planted forest will think gratefully of the men to whose foresight the tree planting was due.

### *Arbor Day.*

Friday, November 14, having been designated by the Acting Governor as "Arbor and Conservation Day," was generally observed in the schools throughout the Territory. In Honolulu members of the "Outdoor Circle"—the organization of ladies that has of late taken so much interest in street tree planting—took

part in the exercises at several of the schools. In at least one or two cases the local improvement association was also represented. At the request of the principal, Mr. I. M. Cox, I said a few words at the Kalihiwaena school.

As usual there was a general free distribution of trees from the Government Nursery. In the afternoon 443 school children each received a tree as they passed through the grounds. Nearly four thousand trees were sent out for school ground planting, and almost twice as many more to the homesteaders and other individual applicants. A special attempt was made to give the homesteaders in some of the recently opened tracts the chance to get free trees. The offer was well taken up and good-sized consignments went to Haiku, Maui, and to Kapaa, Kauai. In all 11,691 trees were given out on Arbor Day from Honolulu. But this is not the total distribution, for it does not include those given away at the sub-nurseries at Hilo, Hawaii, and at Homestead, Kauai.

### *Trip to Maui.*

From November 19 to 22 I accompanied the President of the Board on a trip to the Kula District on Maui to look into forest matters that await action before the Board of Commissioners. During the remainder of the month I have been in Honolulu, occupied with routine work.

### *Seed Introductions.*

There have recently been received from Mr. Joseph F. Rock, consulting botanist of the Board of Agriculture and Forestry, consignments of forest tree seeds from the Philippines, where he had stopped for a time en route to Europe. Some of the seed sent is from trees never before tried in Hawaii. It is being given special care in the nursery. When large enough to plant out the seedlings will be planted in carefully selected places where they can be watched and studied.

### *Routine Work at the Nursery.*

The regular routine work at the Government Nursery goes on as usual. Mr. Haughs' report, transmitted herewith, gives the details of what has been accomplished the past month.

Very respectfully,

RALPH S. HOSMER,  
Superintendent of Forestry.

## REPORT OF FOREST NURSEYMAN.

Honolulu, November 30, 1913.

R. S. Hosmer, Esq., Superintendent of Forestry.

Dear Sir:—I herewith submit a report of the work done during the month of November, 1913.

*Nursery.*

From November 1 to 15 the men employed at the nursery, including the two seed collectors and wagon men, were kept busy packing up and sending out trees for Arbor Day planting. The total number of trees distributed amounted to 11,691. The attached table gives the number of applications received from the principals of the schools on the different islands, also from Honolulu and from others. The number of trees ordered for each island is also recorded.

*Distribution of Plants Since Arbor Day.*

In seed boxes	Pot Grown	Total
2000	55	2055
....	525	525
2000	580	2580

*Collections.*

Collections on account of plants sold amounted to.....	\$ 2 55
Rent of building, nursery grounds for September and October, 1913 .....	70 00
Total . . . . .	\$ 72 55

*Plantation Companies and Other Corporations.*

Under the above heading we received orders and shipped the following trees:

Trees in seed boxes.....	8,000
In transplant boxes.....	7,350
Pot grown .....	250
Total .....	15,600

On November 24, in company with Mr. Van Valkenberg, the writer made a visit to the Kūnia Development Company's lands at Upper Honouliuli for the purpose of examining the tree planting that is being done by the company. The splendid results obtained and the remarkable, rapid growth which the trees are

making arc, there is no doubt, due principally to the great care that has been given the land in the way of plowing and cultivating. A number of varieties of eucalyptus have been planted, the species that have done the best being *E. Globulus*, *E. Citriodora*, *E. Corynocalyx*, and *E. Pilularis*. The outlook is certainly very encouraging and the company is to be congratulated on the splendid showing that is being made.

We have just received from the Honorable W. R. Castle, 10 pounds of koa seed collected in Kona and presented by him to this Board. Owing to the great difficulty we are having in procuring koa seed this gift is certainly very acceptable and we are very much obliged to Mr. Castle for it.

#### *Makiki Station.*

The men at the station have been doing the regular routine work. Owing to the large number of trees sent out for Arbor Day planting and for other purposes, the stock both at the main nursery and at this station has been considerably reduced and we will be busy for some time to come in replenishing it.

#### *Honolulu Watershed Planting.*

The work done on the face of Round Top has been principally clearing off and making holes for trees. Koa trees to the number of 649 were planted during the month. The ground is now in good condition for planting and we intend filling all the holes that are ready with koa trees.

#### *U. S. Experimental Planting, Nuuanu Valley.*

The man employed to plant and take care of the trees has been kept busy attending to the plants in the nursery, also hoeing the trees that require it.

Respectfully submitted,

DAVID HAUGHS,  
Forest Nurseryman.

#### DIVISION OF HYDROGRAPHY.

December 8, 1913.

Board of Commissioners of Agriculture and Forestry.

Gentlemen:—The following report of operations of the Division of Hydrography for the month of November, 1913, is submitted:

#### *Special Kona, Hawaii, Investigation.*

The field surveys and investigations in Kona were completed on November 30 by Howard Kimble, assistant engineer. Routine



field work in the nature of rainfall observations, and the operation of a clock register steam gaging station on the Kiilac stream, will be continued at least through the calendar year 1914. Fifteen monthly rain gages will be read, part by an employee of the Bishop Estate, gratis; and part by a gage reader employed by this division. The records from these stations, combined with those from stations maintained by private persons, should give sufficient data to furnish a good approximation of the relative precipitation over the entire Kona districts.

All maps, data, etc., will be assembled as nearly as possible during December, but the completed report and recommendations will not be furnished until the rainfall and run-off records of 1914 have been studied and considered.

From November 10 to 14 the undersigned, accompanied by Mr. T. F. Sedgwick, underground water expert, made an inspection trip over a part of North and South Kona. Mr. Sedgwick examined the underground possibilities of water and will submit a report relative thereto.

### *Heavy Precipitation.*

Heavy rainfall has been reported from all islands, and the serious conditions of drought a few months past have been changed to conditions of a superabundance of water which has done considerable damage to fields, roads, bridges, etc. Records received from high level rainfall stations as a rule show the heaviest precipitation in the past two years.

At the intake of the Wahiawa Water Company's ditch on the headwaters of the north fork of the Kaukonahua stream 39.6 inches fell between November 1 and 25, while over 33 inches were recorded during the month in the upper Nuuanu valley. Extreme floods occurred all over Oahu on the night of November 20. On the south fork of the Kaukonahua stream the new masonry diversion dam of the water supply system of Schofield Barracks was destroyed by an extreme flood which, according to the coöperative gaging station maintained by the U. S. Army and this division, totaled more than one thousand cubic feet per second. At Keanae, Maui, 43.5 inches of rain fell during the month. On all islands the construction work was delayed by floods.

### *Kauai.*

Mr. W. V. Hardy, field assistant, assisted by Mr. D. E. Horner, field assistant, completed trails from the present power line trail to the new Stevens clock register gaging station sites located at an elevation of 700 feet on the Hanalei and Kalihiwai streams. The materials for these stations were also packed into the station sites on men's backs. This work was done under hard conditions as both streams were in flood most of the time. Five stream measurements were made and three rain gaging stations were

visited. Mr. Hardy spent 27½ days in the field and Mr. Horner 23 days. Heavy rainfall made trails and roads almost impassable during the month.

#### *Oahu.*

On November 4, 7, and 25 to 29 the undersigned made reconnaissances of streams in the Kanohe, Heeia, Kahana, Punaluu, Kaluanui, Kaipapau, Laie and Malae Kahana valleys on windward Oahu. It is estimated that sixteen stream gaging stations will be established in these basins during the calendar year 1914. Coöperation has been promised by the Heeia Agriculture Company and the Kahuku Plantation Company. Nineteen stream measurements were made and five rain gaging stations were visited by Mr. J. C. Dort, office engineer, and Mr. G. R. White, field assistant. From November 24 to 31 Mr. White constructed new weirs on the Makawao ditch, the Pohakea and Kahanaiki streams, built foot bridges for flood measurements on the Makawao and Kaimi streams, and improved the cross sections of all stations in the Kailua and Kahanaiki valleys by removing boulders and other obstructions.

#### *Maui.*

On Maui Mr. C. T. Bailey, assistant engineer, in charge, assisted by Mr. E. O. Christiansen, assistant engineer, made 29 stream gaging measurements. Construction work on the new clock register stations on East Maui was delayed by floods. The station on the Honomanu was completed, and most of the "above water" construction was finished on the Wailuanui, West Wailuaiki, East Wailuaiki, and East Kopiliula streams.

Very respectfully,

G. K. LARRISON,  
Superintendent of Hydrography.

### *SUGGESTED COCONUT INDUSTRY.*

*(Honolulu Star-Bulletin, November 19.)*

The long dormant undertaking of coconut raising in the Hawaiian Islands as an industry bids fair to be revived if the present plans of Alexander Z. Rothschild, a prominent manufacturer of San Francisco, who arrived in Honolulu in the Siberia Monday evening, materialize. The utilization of the husk of the coconut forms the basis of a new industry the investigation of which has called Mr. Rothschild to this city, and although he is not now ready to give out what this new industry involves, or what products will be derived from it, he intimates that he is backed up by sufficient capital to start a factory here in case he can come to favorable terms with persons who would be willing to enter into the business of growing the nuts.

"My visit is simply one of investigation," said Mr. Rothschild when seen this morning. "I believe that there is a wide field to encourage the growing of coconuts here in Hawaii, as I have a patented process for utilizing the husk of the nut, and, if I can come to agreements where I may be assured of being supplied with all the coconuts which I desire in the business, I intend starting a manufacturing plant here in Honolulu which will turn out this product. I am a member of a company which is looking into the matter; not only here, but in the Philippines and in other places. This company is capitalized at a large amount, and in case this factory would be started, no local money would be taken into the proposition. The manufacture of this product is not a new one, but will be new to these Islands."

Mr. Rothschild said that at this time he did not care to give out any information as to just what this product is which he intends deriving from the husk of the coconut, saying that all this would come out later in case he can interest small farmers and others in growing the nuts.

"If I could secure a million nuts today, I would immediately go about establishing a factory. The only drawback now is to get the farmers interested in the growing so that, should we start the factory, we could be assured of a constant supply of material. I intend visiting on Oahu and on the other islands during my stay here, and from Honolulu I shall go to the Philippines and make a like investigation there.

"I believe that if my plans are carried through, as well as those of the company, it will result in the formation of a new, paying industry for the Hawaiian Islands. The factory which we would establish would be able to make use of all the coconuts obtainable and for an indefinite length of time. With regard to securing the nuts, our plan would be to contract for them while on the trees for periods of a year or more. Here is a splendid chance for the small farmer as well as the large farmer, for the prices which we would pay for the nuts would be well worth their growing."

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### COLLEGE IMPROVING CORN CULTURE.

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(*Honolulu Star-Bulletin*, November 19.)

The College of Hawaii in its course in "crop improvement" is developing superior strains of five standard varieties of field corn suited to Hawaiian conditions.

The main object sought after in the experimental breeding work thus far undertaken is to develop high yielding strains of uniform quality. The work done by the agricultural students at the college farm in Manoa during the past year has given results that are highly noteworthy. Some of the actual yields are exceeding 90 bushels per acre, with an average of about 70 bushels

per acre as an average for all varieties tested. These are record yields and show the value of thoroughbred seed stocks which are now being developed with the same care as is thoroughbred live stock.

Beginning December 1 the College of Hawaii offers for free distribution to all who will agree to report upon the results of their experimental plantings, two pounds of seed of each of the following four varieties. It requires about eight pounds of seed to plant an acre, so that the seed allotted to each applicant will be sufficient to plant a fourth acre of each of four varieties.

*Reid's Yellow Dent.*—The standard yellow dent corn of the great corn belt. Bright golden yellow, red cobs with medium-sized kernels, shelling 85 to 90 per cent. of grain. Matures in about 110 days from early spring planting at College of Hawaii farm.

*Boone County White.*—Pure white, large ears and deep medium-rough kernels. Produces a high percentage of shelled corn. Requires about 120 days to mature.

*Funk's Ninety-day Yellow Dent.*—One of the earliest maturing yellow dent corns. Ears small to medium (averaging seven to eight inches in length, eight to ten ounces in weight). A strain of this variety yielded at the rate of 91 bushels per acre at the college farm during the past season, where it matured in less than 100 days. Owing to its early maturity this variety will probably prove itself well suited to locations of low rainfall.

*Silver Mine.*—An early maturing white dent corn. The kernel is deep and broad, giving a vigorous germ. Shells as high as 88 per cent. of grain. Matures in about 100 days.

This is a noteworthy advance in the local production of high-grade corn, and is engaging the attention, not only of small planters, but also of the large plantation managements.

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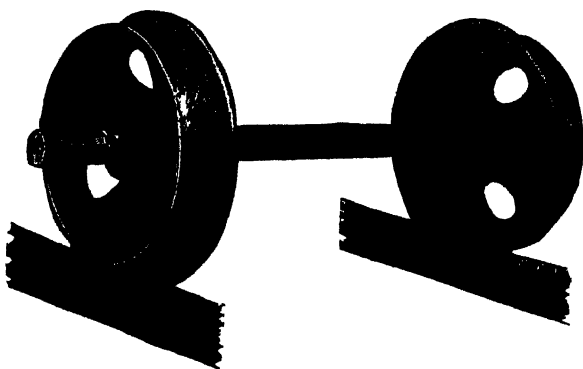
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